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No. 44

PROFILES OF RIVERS IN THE UNITED STATES.—GANNETT

WASHINGTON
GOVERNMENT PRINTING OFFICE
1901

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IRRIGATION REPORTS.

The following list contains titles and brief descriptions of the principal reports relating to water supply and irrigation prepared by the United States Geological Survey since 1890:

1890.

First Annual Report of the United States Irrigation Survey, 1890; octavo, 123 pp.

Printed as Part II, Irrigation, of the Tenth Annual Report of the United States Geological Survey, 1888–89. Contains a statement of the origin of the Irrigation Survey, a preliminary report on the organization and prosecution of the survey of the arid lands for purposes of irrigation, and a report of work done during 1890.

1891.

Second Annual Report of the United States Irrigation Survey, 1891; octavo, 395 pp.

Published as Part II, Irrigation, of the Eleventh Annual Report of the United States Geological Survey, 1889–90. Contains a description of the hydrography of the arid region and of the engineering operations carried on by the Irrigation Survey during 1890, the statement of the Director of the Survey to the House Committee on Irrigation, and other papers, including a bibliography of irrigation literature. Illustrated by 29 plates and 4 figures.

Third Annual Report of the United States Irrigation Survey, 1891; octavo, 576 pp.

Printed as Part II of the Twelfth Annual Report of the United States Geological Survey, 1890–91. Contains "Report upon the location and survey of reservoir sites during the fiscal year ended June 30, 1891," by A. H. Thompson; "Hydrography of the arid regions," by F. H. Newell; "Irrigation in India," by Herbert M. Wilson. Illustrated by 93 plates and 190 figures.

Bulletins of the Eleventh Census of the United States upon irrigation, prepared by F. H. Newell; quarto.

No. 35, Irrigation in Arizona; No. 60, Irrigation in New Mexico; No. 85, Irrigation in Utah; No. 107, Irrigation in Wyoming; No. 153, Irrigation in Montana; No. 157, Irrigation in Idaho; No. 163, Irrigation in Nevada; No. 178, Irrigation in Oregon; No. 193, Artesian wells for irrigation; No. 198, Irrigation in Washington.

1892.

Irrigation of western United States, by F. H. Newell; extra census bulletin No. 23, September 9, 1892; quarto, 22 pp.

Contains tabulations showing the total number, average size, etc., of irrigated holdings, the total area and average size of irrigated farms in the subhumid regions, the percentage of number of farms irrigated, character of crops, value of irrigated lands, the average cost of irrigation, the investment and profits, together with a résumé of the water supply and a description of irrigation by artesian wells. Illustrated by colored maps, showing the location and relative extent of the irrigated areas.

1893.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, Part III, Irrigation, 1893; octavo, 486 pp.

Consists of three papers: "Water supply for irrigation," by F. H. Newell; "American irrigation engineering" and "Engineering results of the Irrigation Survey," by Herbert M. Wilson; "Construction of topographic maps and selection and survey of reservoir sites," by A. H. Thompson. Illustrated by 77 plates and 119 figures.

A geological reconnoissance in central Washington, by Israel Cook Russell, 1893; octavo, 108 pp., 15 plates. Bulletin No. 108 of the United States Geological Survey; price, 15 cents.

Contains a description of the examination of the geologic structure in and adjacent to the drainage basin of Yakima River and the great plains of the Columbia to the east of this area, with special reference to the occurrence of artesian waters.

1894.

Report on agriculture by irrigation in the western part of the United States at the Eleventh Census, 1890, by F. H. Newell, 1894; quarto, 283 pp.

Consists of a general description of the condition of irrigation in the United States, the area irrigated, cost of works, their value and profits; also describes the water supply, the value of water, of artesian wells, reservoirs, and other details; then takes up each State and Territory in order, giving a general description of the condition of agriculture by irrigation, and discusses the physical conditions and local peculiarities in each county.

Fourteenth Annual Report of the United States Geological Survey, 1892–93, in two parts; Part II, Accompanying papers, 1894; octavo, 597 pp.

Contains papers on "Potable waters of the eastern United States," by W J McGee; "Natural mineral waters of the United States," by A. C. Peale; "Results of stream measurements," by F. H. Newell. Illustrated by maps and diagrams.

(Continued on third page of cover.)

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UNITED STATES GEOLOGICAL SURVEY

CHARLES D. WALCOTT, DIRECTOR

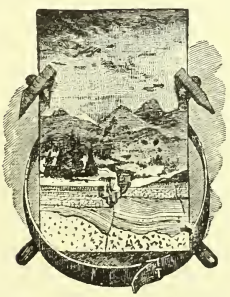
PROFILES OF RIVERS

IN THE

UNITED STATES

BY

HENRY GANNETT



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MAP OF THE
UNITED STATES
Showing the rivers whose profiles are illustrated
Scale
100 0 100 200 300 400 500 MILES

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PROFILES OF RIVERS IN THE UNITED STATES.

By Henry Gannett.

GENERAL DISCUSSION.

The profiles here represented are derived from various sources and differ from one another greatly in accuracy. Many of them are drawn from the annual reports of the Chief of Engineers, U. S. A., under which are included the reports of the Mississippi and Missouri River commissions. The heights thus obtained are those of the level of water in the rivers at certain stages, and may be regarded as of great accuracy. Others have been obtained from railroad profiles, being the level of the rivers at points where the railroads touch or cross them. Still others have been taken from the atlas sheets of the United States Geological Survey and from other maps. In most such cases the points at which the contours cross the rivers upon the maps have been taken. These again differ in point of accuracy with the means adopted for the location of the contours. Where the spirit level was used in locating contours it may be assumed that the determinations are fairly good, but where the barometer was used the probable error may be of considerable magnitude. Such elevations are, however, mainly in the mountainous parts of the country, where the fall of the streams is great, and where, therefore, errors of considerable magnitude may be tolerated, as affecting but little the form of the profile.

The rivers whose profiles are presented in the following pages are indicated upon the map which forms Pl. I. The profiles are given in figures, showing the distance between points, the height at each point, and the average fall per mile between points. They are also represented graphically upon Pls. II to XI, inclusive. All these profiles are represented upon the same horizontal and vertical scales, the former being 100 miles to an inch and the latter 2,000 feet to an inch. This relation between the scales, which scarcely suffices to show any slope in the Lower Mississippi, gives the appearance to many other streams of exceeding steepness, as in the case of those flowing out of the Sierra Nevada. Still it was judged best, after much consideration, to use uniform scales throughout, in order that comparisons between different rivers might be made directly.

ST. CROIX RIVER.

The drainage basin of this river is in eastern Maine, a portion of it projecting over into New Brunswick. Its area is 1,674 square miles. Its surface is undulating and hilly, but not mountainous, and is, in the main, densely forested.

At a distance of 20 miles from its mouth the river forks, the main branch, known as the Kennebasis, coming down from the north. It is of this branch that the profile is given. The other branch, known as the Chiputneticook, comes from the west.

To illustrate the lacustrine character of this stream it may be stated that there are within its drainage basin, and tributary to it, no fewer than 27 lakes, ranging in size from three-quarters of a square mile up to 27 square miles, and with a total area of 134 square miles.

Upon the river and its northern tributary there are many falls and rapids, only a few of which have been utilized.

The profile shows great and recent disturbances, changing it materially from the normal profile which it must have presented at the opening of the Glacial epoch.

The figures are from Wells's Water Power of Maine.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Upper bridge, Milltown, mouth	0	0	
Baring bridge	5¼	86	
Foot of Sprague falls	10¼	93	9
Head of Sprague falls	10¾	118	50
Head of Enoch rips	11¼	128	
Pitch of Lower Grand falls	19¼	145	3
Head of Upper Grand falls	19¾	165	40
Foot of Grand Chiputneticook falls	22	169	2
Head of Grand Chiputneticook falls	22¾	190	28
Foot of Canoose rips	30	200	1
Head of Canoose rips	30½	211	22
Foot of Haycock rips	33¼	212	
Head of Haycock rips	33¾	218	12
Foot of Meeting-house rips	34¾	218	
Head of Meeting-house rips	35¾	226	8
Foot of Rocky rips	36½	227	
Head of Rocky rips	39¾	252	8
Foot of Mile rips	50	353	
Head of Mile rips	51	358	5
Foot of Kill-me-quick rips	54	372	5
Head of Kill-me-quick rips	54½	382	20
Head of Chiputneticook Lake	74½	382	
Stream into Mud Lake	76¼	426	22
Head of Mud Lake	80½	426	

PENOBSCOT RIVER.

This, the largest river in the State, has a drainage area of 8,934 square miles, its greatest length being 160 miles, and its greatest breadth 115 miles. Its surface is hilly or undulating, in the main forest-clad and full of lakes; indeed, within its basin 185 lakes and ponds have been counted, having a total area of 395 square miles.

The course of the river is crooked; indeed, in its upper part it has apparently no definite direction, flowing through lakes and swamps. It meets tide at Vinal Mills, 39 miles above its mouth. Its profile is equally irregular, consisting of level reaches, rapids, and falls.

The profile is from the census report on Water Power, 1880.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	.....
Bangor	27	0	.....
Head of falls, Vinal Mills	39	92	7.7
Mouth of Mattawamkeag River	84	190	2.2
Chesuncook Lake	120	900	19.7
Penobscot Lake	200	1,509	7.6

KENNEBEC RIVER.

This river has its source in Moosehead Lake, from which it flows in a generally southward direction to its mouth below Bath. It meets tide at Augusta, 26 miles above Merrymeeting Bay, and about 40 miles above its mouth. Its drainage area, excluding Androscoggin River, is 6,400 square miles, most of which, and especially the northern part, is densely forested. It is in a lacustrine region containing hundreds of lakes and ponds, most of which are small in area. The profile is from the census report on Water Power, 1880.

Locality.	Distance from Merrymeeting Bay.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Merrymeeting Bay	0	0	.....
Augusta, head of tide	26	0	.....
Head of Kendall Mills rip	48	91	4.1
Norridgewock	66	138	2.6
Dam at Madison bridge	79	236	7.5
Head of Caratunk falls	90	316	7.3
Moosehead Lake	138	1,023	14.7

ANDROSCOGGIN RIVER.

This river heads in the White Mountains, in New Hampshire, and flows in a generally eastward and southeastward direction, joining the Kennebec in Merrymeeting Bay. Its drainage basin presents the same characteristics as those of the Penobscot and Kennebec, varied by the fact that its sources are in a mountain region and at a considerable elevation. It has the same forest-clad, lacustrine character. The river contains numerous falls, many of which, especially at Lewiston, have been greatly utilized. The total area drained measures 3,698 square miles, of which three-fourths lie in Maine and the remainder in New Hampshire. The profile is from the census report on Water Power, 1880.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, Merrymeeting Bay	0	0	.....
Head of Rumford falls	75	600	8.0
Bethel	100	620	0.8
State line	114	690	5.0
Head of Berlin falls	128	1,048	25.6
Head of river proper	160	1,256	6.5
Parmachene Lake	186	1,600	13.2
Magalloway Lake	199	2,225	48.1

SACO RIVER, MAINE AND NEW HAMPSHIRE.

This stream heads in eastern New Hampshire and flows east and southeast to its mouth, near Saco and Biddeford. Its drainage basin, having an area of 1,750 square miles, half of which is in Maine and half in New Hampshire, is quite similar in its characteristics to the basins of the other rivers of these States. Its head is in the southern part of the White Mountains, and it flows thence through the low country in Maine.

The profile is from the census report on Water Power, 1880.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	.....
Mouth of Ossipee River	40	266	6.7
Foot of Great falls	45	271	1.0
Head of Great falls	45	343	.....
Conway Center	73	412	2.5
Mouth Ellis River	83	511	9.9
West boundary of Bartlett	92	745	26.0
Head	104	1,880	94.6

MERRIMAC RIVER.

This little stream, which probably turns more spindles than any other stream of the United States, heads in the central part of New Hampshire, and flows in a direction a little east of south into northeastern Massachusetts, which it traverses in a northeast course to its mouth, at Newburyport. Its drainage basin is 4,864 square miles. The upper portion is a forest-clad, lacustrine region, but it soon enters a country which is densely settled and has been largely cleared of forests. Everywhere, however, it abounds in lakes and ponds. Its profile shows the irregularities which are so characteristic of the streams of New England, consisting of a succession of still reaches alternating with falls and rapids.

The profile is from the census report on Water Power, 1880.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
Mitchell falls	22	0	
Foot of locks at Lawrence	27	10	2.0
Top of Lawrence dam	28	39	29.0
Foot of Hunt falls	37	42	0.3
Head of Hunt falls	38	53	11.0
Top of Pawtucket dam, Lowell	40	87	17.0
State line	49	90	0.3
Mouth of Nashua River	53	93	0.8
Foot of Cromwell falls	57	93	0.0
Foot of Goff falls	64	112	2.7
Head of Goff falls	65	117	5.0
Manchester, below falls	68	126	3.0
Top of Manchester dam	69	178	52.0
Hooksett, below falls	78	181	0.3
Hooksett, top of dam	79	197	16.0
Foot of Garvin falls	83	199	0.5
Head of Garvin falls	83	227	28.0
Foot of Sewell falls	93	229	0.2
Head of Sewall falls	95	248	9.5
Mouth of Contoocook River	96	249	1.0
Franklin, head of river	110	269	1.4

CONTOOCOOK RIVER.

This is a branch of Merrimac River in New Hampshire. It heads in the southwestern part of the State, near the Massachusetts line, and flows northeastward to its connection with the parent stream. It has a rapid fall, supplying many water powers.

The profile is from the census report on Water Power, 1880.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	249	
Just above Contoocook	11	365	10.5
Just below Henniker	21	389	2.4
Foot of Long fall	22	433	44.0
Head of Long fall	24	546	56.5
Foot of falls at Hillsboro bridge	27	564	6.0
Head of falls at Hillsboro bridge	27	591	
Foot of falls at Bennington	36	606	1.7
Head of falls at Bennington	37	676	70.0
Foot of falls at North Peterboro	44	714	5.4
Head of falls at North Peterboro	44	724	1.5
Foot of falls at Peterboro	46	727	
Head of falls at Peterboro	46	734	35.25
Hillsboro county line	50	875	
Three Ponds, in Rindge	55	1,114	47.8

CONNECTICUT RIVER.

Connecticut River heads near the boundary line between the State of Vermont and Canada in a series of small lakes at an altitude exceeding 2,000 feet, flows thence in a southerly course, forming the boundary between Vermont and New Hampshire, and thence across Massachusetts and Connecticut to its mouth in Long Island Sound. Its total length is nearly 400 miles, and its fall in that distance somewhat more than 3,000 feet, being an average of about 5 feet per mile. It is tidal to Hartford, 50 miles above its mouth. The area of its basin includes 11,269 square miles. The upper part of this is forest clad, but lower down, and especially throughout Massachusetts and Connecticut, the forests have been largely cleared away for settlement. Throughout it is in a lacustrine region. From its head as far as central Massachusetts it has a narrow valley, but in southern Massachusetts and northern Connecticut the valley expands broadly, owing to the fact that it is here composed of Triassic sandstones, which are much softer than the Archean rocks in which its course lay above. Below Holyoke its course is crossed by a dike of trap which has retarded its work of eroding its bed, forming a partial dam, behind which the river becomes very gentle, sluggish, and winding, developing a broad course in its bottom land.

One of its curves is known as the Oxbow, which has been cut off, and has become a crescent-shaped lake, similar to those so common in the valley of the Lower Mississippi.

The profile is from the census report on Water Power, 1880.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	.....
Hartford	50	0	.....
Foot of Enfield rapids	60	6	0.6
Top of Enfield dam	66	38	5.3
Top of Holyoke dam	84	98	3.3
Fitchburg R. R. crossing	115	109	0.35
Top of Turners Falls dam	120	173	12.8
Mouth of Ashuelot River	136	206	2.1
Westmoreland	159	219	0.6
Foot of Bellows falls	170	234	1.4
Head of Bellows falls	170	283	.....
Beaver Meadows, Charlestown	181	289	0.5
Windsor	196	304	1.0
White River Junction	209	339	2.7
Ledyard bridge, Hanover	213	375	9.0
Oxford	230	380	0.3
Wells River	255	407	1.1
Foot of McIndoes falls	262	432	3.6
Lower Waterford	273	643	19.2
Head of Fifteen-mile falls	285	830	15.6
North Stratford	312	885	2.0
West Stewartstown	344	1,035	4.7
Connecticut Lake	361	1,618	34.3
Second Lake	369	1,882	15.5
Third Lake	375	2,038	26.0

HOUSATONIC RIVER.

This important stream heads in western Massachusetts, flows southerly down into Connecticut, and then turns to the southeast, emptying into Long Island Sound near Bridgeport. It has a drainage basin of 1,933 square miles. In its upper course it flows through a hilly country, partially cleared, the hills gradually becoming smaller and the proportion of woodland less as the stream is traced southward.

The profile is from the census report on Water Power, 1880.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
Mouth of Shepaug River	30	105	3.5
Two miles above Cornwall bridge	64	457	10.2
Falls village	73	622	19.4
Ashley Falls, Mass	82	705	9.2
Pittsfield	123	983	4.3

HUDSON RIVER.

This river heads in Lake Tear of the Clouds, in the heart of the Adirondacks, at a great altitude, and comes down the south slope of that mountain group with a steep descent, flowing through many ponds and over many cataracts and waterfalls in its course. The profile rapidly flattens as the river leaves the mountains, but in the neighborhood of Glens Falls, near its junction with the Mohawk, it makes a series of abrupt drops, due to passing over hard rock beds, which furnish valuable water power. It reaches tide at Troy, 150 miles from its mouth.

Its drainage area, including Mohawk River, is 13,366 square miles.

The profile is from the census report on Water Power, 1880.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
Troy	150	5	0.03
Crest of Saratoga dam	180	102	3.2
Fort Edward R. R. bridge	190	118	1.6
Crest of Glens Falls feeder dam	197	284	23.7
Mouth of Secondaga River	216	536	13.3
Mouth of Stony Creek	222	571	5.8
Mouth of Schroon River	228	594	3.8
The Glen	236	720	15.7
Mouth of Mill Creek	240	817	24.2
Mouth of North Creek	248	981	20.5
North of River village	253	1,041	12.0
Mouth of Boreas River	257	1,134	23.3
Mouth of Indian River	265	1,403	33.6
Mouth of Cedar River	266	1,454	51.0
Lake Tear of the Clouds	300	4,322	84.4

MOHAWK RIVER.

This, the main western branch of Hudson River, flows eastward through a broad depression between the Adirondacks and the Helderberg Plateau. The irregularities of its profile are due mainly to its flowing over the edges of hard rock beds. Its principal fall is that at Cohoes, near its mouth.

The profile is from the census report on Water Power, 1880.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	12	.....
Lower aqueduct (fall nearly all at Cohoes)	4	162	37.5
Schenectady	19	214	3.5
Mouth of Schoharie Creek	42	270	2.4
Three miles east of Utica	95	393	2.3
Four miles east of Rome	112	418	1.5
Rome, above feeder dam	115	431	4.3

PASSAIC RIVER.

[From the census report on Water Power, 1880.]

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	.....
Passaic	29	0	.....
Dundee dam, crest	30	22	22.0
Paterson, below falls	41	39	1.5
Paterson dam, crest	42	115	76.0
Little falls, dam	47	162	9.4
Lower Chatham bridge	69	168	0.3
Near Madisonville	86	240	4.2

DELAWARE RIVER.

This river heads in the western slopes of the Catskill Mountains and in the plateaus north of them, flows in a course alternating between southwest and southeast, but generally southeast, to its mouth, in Delaware Bay, reaching tide at Trenton. Throughout most of its course it forms the boundary line between Pennsylvania, on the west, and New York or New Jersey, on the east. The length of the stream,

following its windings from its source to Trenton, is about 280 miles, and its average fall about 6.7 feet per mile. Its drainage area, including all its branches, is 12,012 square miles.

The first part of its course is down the declivities of the Catskill Mountains. Shortly thereafter it enters the faulted and folded region of the Appalachian Valley, flowing alternately with the ridges and across them. At Delaware Water Gap it passes the Kittatinny Range. At Trenton, where it crosses the Fall Line and meets tide, there is a fall of nearly 8 feet, which furnishes a valuable water power.

The profile is mainly from the census report on Water Power, 1880.

Locality.	Distance from Trenton.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Trenton, below falls	0	0	.....
Yardley	3	8	2.7
Bull Island	26	74	2.9
Easton	54	159	3.0
Belvidere	68	235	5.4
Delaware Water Gap	81	301	5.1
Four miles above Port Jervis	127	450	3.2
Lackawaxen	146	600	7.9
Deposit	212	984	5.8
Head	280	1,886	13.3

LEHIGH RIVER.

[From the census report on Water Power, 1880.]

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	159	.....
Bethlehem	12	205	3.8
Slatington	33	350	6.9
Lehighton	42	450	11.1
Mauch Chunk, below dam	46	504	13.5
	54	690	23.2
Near White Haven	70	1,105	25.9
Stoddartsville	83	1,457	27.1

SCHUYLKILL RIVER.

This river heads in Schuylkill County, in eastern Pennsylvania, and flows southeast to its junction with the Delaware at Philadelphia. In its course through Schuylkill and Berks counties it traverses numerous water gaps through the ridges of the Appalachian Valley. Its length is 112 miles, and its drainage basin about 1,800 square miles. The average fall of the river is about 5 feet per mile.

The profile is from the census report on Water Power, 1880.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	.....
Fairmount	8	0	.....
Pawlings dam	30	67	3.0
Reading	70	205	3.45
Port Clinton	92	390	8.4
Landingville	100	472	10.25
Schuylkill Haven	105	509	7.4
Port Carbon	112	619	15.7

SUSQUEHANNA RIVER.

Susquehanna River rises in two large branches known as the North and West branches, the former rising in southern New York and the latter in central Pennsylvania, both branches heading in the Allegheny plateau. The drainage basin of the entire river is 27,655 square miles, three-fourths of it being within the State of Pennsylvania. The length of the river, following up the North Branch, is 422 miles. The North Branch pursues an extremely crooked course, flowing in a generally southwesterly course in the State of New York, changing in northeastern Pennsylvania to a southeast course, until it flows out of the plateau and into the great Appalachian Valley. Then it flows southwestward to its junction with the West Branch at Sunbury. Most of this part of its course lies in limestone valleys, but in several cases it breaks through ridges from valley to valley, forming water gaps.

The West Branch heads in Cambria County and flows, at first, northward and northeastward and then southeastward until it leaves the plateau and enters the valley. Then it flows eastward in a limestone valley, at the south foot of the Allegheny Front, until it reaches a point north of Sunbury, whence it flows southward to its junction at that place with the North Branch, cutting several water gaps through opposing ridges on its way.

From Sunbury to Harrisburg the main Susquehanna flows nearly south across the trend of the ridges and valleys. In this part of its course the river cuts five fine water gaps. Through each of these the stream runs with accelerated velocity, while in the intervening limestone valleys it has a leisurely flow. From Harrisburg the river flows southeast to the head of Chesapeake Bay, most of the way through a rolling, highly cultivated country.

Between Sunbury and Harrisburg the profile is slightly convex, showing the effect in retarding the progress of the river's erosion of the hard ridges which it crosses.

The profile is from the census report on Water Power, 1880.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
State line	12	69	5.8
Mouth of Fishing Creek	20	100	3.9
Foot of Columbia dam	43	224	5.4
Crest of Columbia dam	43	231	
Foot Conewago falls	57	254	1.6
Above Conewago falls	59	273	9.5
Harrisburg	69	298	2.5
Rockville	75	305	1.16
Clark ferry dam, foot	84	336	3.4
Clark ferry dam, crest	84	343	
Liverpool	99	378	2.3
Selinsgrove	116	421	2.5
Sunbury dam, foot	122	422	0.2
Sunbury dam, crest	122	429	
Nanticoke dam, foot	174	509	1.5
Nanticoke dam, crest	174	515	
Wilkesbarre	183	521	0.66
Mouth of Lackawanna River	190	536	2.14
Mouth of Tunkhannock Creek	211	581	2.14
Mouth of Meehoopany Creek	223	604	1.9
Mouth of Wyalusing Creek	244	646	2.0
Mouth of Wysox Creek	258	687	2.9
Towanda	262	700	3.2
Athens	278	744	2.7
Otsego Lake	422	1,193	3.1

WEST BRANCH OF SUSQUEHANNA RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	429	
Lewisburg dam, foot	7	431	
Lewisburg dam, crest	7	434	
Muncy dam, foot	23	462	1.75
Muncy dam, crest	23	469	
Williamsport dam, foot	39	498	1.8
Williamsport dam, crest	39	508	
Lockhaven dam, foot	65	539	1.2
Lockhaven dam, crest	65	550	
Queens Run dam, foot	69	551	0.25
Queens Run dam, crest	69	557	
Keating	105	695	3.8
Curwinsville	160	1,117	7.7

JUNIATA RIVER.

This is a large western branch of Susquehanna River, which heads in the Appalachian Valley, under the Allegheny Front, and flows with a generally eastward, but an extremely crooked, course to its mouth, a few miles above Harrisburg. Its course is throughout an alternation of gentle stretches in limestone valleys and of rapid courses through water gaps. Its drainage basin comprises 3,223 square miles.

The profile is from the census report on Water Power.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	336	
Millerstown dam, foot	16	380	2.7
Millerstown dam, crest	16	388	
Lewistown dam, foot	44	442	1.9
Lewistown dam, crest	44	450	
Newton Hamilton dam, foot	68	512	2.6
Newton Hamilton dam, crest	68	520	
Huntington dam, foot	90	610	4.1
Huntington dam, crest	90	622	

POTOMAC RIVER.

This river heads in several long branches in the Appalachian Valley, in Virginia, and in the edge of the Allegheny Plateau. The North and South branches of the Potomac and the Shenandoah River flow in lines that are parallel to one another, with a course somewhat east of north, for long stretches through limestone valleys. The North Branch, which is the uppermost of the head streams, turns eastward at Cumberland and, thence known as the Potomac, flows in a generally southeasterly course as far as Washington, where it reaches tide level, being joined on the way by the South Branch of the Potomac at Piedmont and by the Shenandoah River at Harpers Ferry. In the upper part of its course it crosses a number of ridges in water gaps, and at Harpers Ferry crosses the Blue Ridge, cutting a gap nearly 1,000 feet in depth.

The obstruction produced by the rocks of the Blue Ridge at Harpers Ferry has retarded the stream to such an extent that above this point both the main river and its branch, the Shenandoah, have been locally graded for a long distance upstream, giving them gentle and very crooked courses. The drainage basin of the Potomac River is 14,479 square miles, including the Shenandoah, which has an area of 2,850 square miles.

The following profiles of the Potomac, its South Branch, and the Shenandoah with its North Fork, are from the atlas sheets of the United States Geological Survey:

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, Point Lookout	0	0	
Chain bridge, above Georgetown, D. C	115	20	0.2
Head of Little falls	116	40	20.0
Foot of Great falls	121	60	4.0
Head of Great falls	125	150	22.5
	141	200	3.1
Harpers Ferry	172	250	1.6
	179	300	7.1
Hancock	220	400	2.4
	244	500	4.2
Cumberland	290	600	2.2
	310	700	5.0
	316	800	16.7
	320	900	25.0
	324	1,000	25.0
	330	1,200	33.3

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Cumberland	334	1,400	50.0
	338	1,600	50.0
	342	1,800	50.0
	346	2,000	50.0
Wilson	358	2,500	41.7

SOUTH BRANCH OF POTOMAC.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, near Green Spring	0	545	.....
	15	600	3.7
Romney	27	700	8.3
Moorefield	52	800	4.0
South Fork of South Branch	65	1,000	15.4
	76	1,200	18.2
	87	1,500	27.3
	103	2,000	31.3

SHENANDOAH RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, Harpers Ferry	0	250	.....
	10	300	5.0
	39	400	3.4
Riverton	58	465	3.4
	68	500	3.5
Overall	82	600	7.1
	94	700	8.3
	115	800	4.8
	133	900	5.5
	147	1,000	7.1
	170	1,200	8.7
	200	1,500	10.0

NORTH FORK OF SHENANDOAH RIVER.

Locality.	Distance from mouth of Shenandoah River.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Riverton	58	465	
	63	500	7.0
	73	600	10.0
	83	700	10.0
	98	800	6.7
	124	900	3.8
	135	1,000	9.1
	147	1,200	16.7

JAMES RIVER.

This tributary to Chesapeake Bay heads in the Allegheny Front, in West Virginia, and flows in a generally eastward course across the Appalachian Valley, cutting across its ridges and finally the Blue Ridge. In its course across the valley and through the Piedmont region it has many rapids. At Richmond it crosses the Fall Line with an abrupt descent of 84 feet and just below that city reaches tide and the head of navigation. From this point to its mouth, 111 miles, it is a tidal estuary. Its drainage basin, including that of its main branch, Appomattox River, comprises 9,684 square miles.

Appomattox River heads in the Piedmont region, flows eastward and joins James River just below Petersburg, at which point it crosses the fall line.

The profile of James River is from the levels of the Engineer Corps, U. S. A., and that of the Appomattox from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
Richmond	111	0	
Grant dam	114	84	28.0
Bosher dam	122	124	5.0
Maiden's Adventure dam	140	143	1.1
Tye River dam	220	375	2.9
Joshua Falls dam	246	463	3.4

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Lynchburg waterworks dam	260	513	3.6
Judith dam	263	540	9.0
Bald Eagle dam	268	558	3.6
Pedlar dam	271	572	4.7
Coleman Falls dam	274	588	5.3
Big Island dam	278	606	4.5
Cushaw dam	282	649	10.8
Blue Ridge dam	287	706	11.4
Quarry Falls dam	290	720	4.7
Varney Falls dam	297	759	5.6
Indian Rock dam	301	786	6.8
Wasp Rock dam	305	812	6.5
Junction Jackson and Cowpasture rivers	325	1,014	10.1

APPOMATTOX RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
	17	100	5.8
Giles mill	59	200	2.4
Near Farmville	98	300	2.6
	110	400	8.3
Head near Appomattox	130	800	20.0

ROANOKE RIVER.

The source of this river is in the Appalachian Valley, in southwest Virginia; thence it flows southeastward to the head of Albemarle Sound. It is navigable to Weldon, above which place it crosses the Fall Line. Its principal branch, Dan River, which heads in the mountains of western North Carolina, exhibits similar peculiarities.

The drainage basin of Roanoke River, including that of the Dan, is 9,237 square miles.

The profile of the Roanoke as far up as Brookneal and that of the Dan are from levels by the Engineer Corps, U. S. A. The upper portion of the Roanoke is from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
Weldon	129	39	0.3
Gaston	132	143	34.6
Stone House Creek	148	181	2.4
Great Creek	160	194	1.1
Allen Creek	172	212	1.5
East Lynne Creek	182	233	2.1
Clarksville, Va	196	289	4.0
Roanoke landing	217	319	1.4
Wallace Creek	223	328	1.5
Old landing	229	337	1.5
Edmunds landing	233	341	1.0
Coles ferry landing	239	350	1.5
Brookneal	249	368	1.8
Head Long Island	261	400	2.7
Wards road ferry	276	500	6.7
Folers ferry, mouth of Pig River	302	600	3.8
Radford ford	317	700	6.7
Lynville ford	330	800	7.7
	341	900	9.1
Salem	360	1,000	5.3
	365	1,100	20.0
	370	1,200	20.0
	379	1,300	11.1
	386	1,400	14.3
	388	1,500	50.0

DAN RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	289	
Danville canal	60	397	1.8
Wilson upper ferry	67	431	4.9
Daniels ferry	78	462	2.8
Leaksville	91	492	2.3
Eagle falls	99	510	2.3
Madison bridge	110	538	2.5
Ladds ford	119	568	3.3
	128	618	5.6
Danbury	138	688	7.0

CAPE FEAR RIVER.

This river heads in the upper part of the Piedmont region and flows southeast to its mouth at Wilmington. It crosses the Fall Line above Fayetteville.

Its drainage basin comprises 8,310 square miles.

The profile is from the report on Water Power of the Tenth Census.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Wilmington	0	0	
Fayetteville	112	7	.06
Smiley falls, foot	139	42	1.3
Smiley falls, head	143	69	6.75
Junction Haw and Deep rivers	172	130	2.1

GREAT PEDEE RIVER.

This river, following up the Yadkin, heads in the Blue Ridge, in the northern part of North Carolina, and flows southeastwardly to its mouth, near Georgetown, South Carolina, its course being throughout in the Piedmont region and the Atlantic Coastal Plain. It exhibits many irregularities, due to recent tilting of the region through which it flows. It crosses the Fall Line above Cheraw.

Its drainage basin is 17,098 square miles.

The profile is from the levels of the Engineer Corps, U. S. A., as far as Wilkesboro; above that point it has been derived from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
Cheraw	149	65	0.4
Foot of Bluitt falls	170	145	3.8
Allentown ferry	199	201	1.9
Christian ferry	208	209	0.9
Mouth Uwharrie River	212	239	7.5
Head of Narrows	214	259	10.0
Stokes ferry	227	505	18.9
Bringle ferry	237	557	5.2
Crossing Southern R. R	259	661	4.7
Mouth of South Yadkin River	263	667	1.5
Dutchman Island	272	680	1.4
Oakes ferry	281	694	1.6

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Bailey ferry	291	711	1.7
Hall ferry	297	726	2.5
Jones mill	309	752	2.2
Sycamore ford	325	790	2.4
Rockford	341	866	4.8
Hurt ledge	351	908	4.2
Sayles ford	362	931	2.1
Mouth of Roaring River	371	958	3.0
Wilkesboro	382	992	3.1
	385	1,000	2.7
	391	1,100	16.7
	403	1,200	8.3
Patterson	410	1,250	7.1

SANTEE RIVER.

This river heads in the eastern slope of the Blue Ridge in several branches, converging in the Catawba, Saluda, and Broad rivers, which flow southwestward across the Piedmont region and the Atlantic Coastal Plain to its mouth, near Cape Romain. Its drainage basin is 14,696 square miles.

The profiles of this river and its branches are from the levels of the Engineer Corps, U. S. A.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
Junction of Wateree and Congaree rivers	208	80	0.4
Head of Wateree River	268	160	1.3
Foot of Gaydon falls	275	226	9.4
Crossing C. C. and A. R. R.	308	461	7.1
State Line	323	485	1.6
Crossing A. and C. R. R.	328	508	4.6
Crossing C. C. R. R	333	522	2.8
Crossing W. N. C. R. R.	370	730	5.6
Crossing Chester and Lenoir R. R	398	884	5.5
Moore shoal	403	908	4.8
Morganton	413	1,010	10.2
Old Fort	463	1,274	5.3
Crossing of Southern R. R.	473	2,050	77.6
Head, in Swannanoa gap	479	2,658	101.3

CONGAREE RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Junction with Wateree River	0	80	.....
Head, Columbia	60	136	1.0

SALUDA RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	136	.....
Crossing of G. & C. R. R	60	383	4.1
	125	749	5.6
Crossing of Southern R. R	135	809	6.0

BROAD RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	136	.....
Ninety-nine Islands	12	176	3.3
Summers shoal, foot	26	229	3.7
Lyle shoal, foot	41	270	2.7
Neal shoal, foot	59	322	2.9
Foot of the gravel	68	340	2.0
Foot of Ninety-nine Islands	94	426	3.3
Head of Cherokee shoal	101	530	14.8
Crossing Southern R. R	105	542	3.0
Green River	141	759	6.0

SAVANNAH RIVER.

This river heads in the eastern slope of the Blue Ridge and flows southeast to its mouth at Savannah. It crosses the Fall Line just above Augusta, where is afforded a fine water power, which is utilized to a large extent, making Augusta the chief cotton-manufacturing point in the South.

The drainage basin of the river is 11,402 square miles.

The profile is from levels by the Engineer Corps, U. S. A.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Savannah	0	0	.....
Crossing of C. & S. R. R.	14	4	0.3
Purysburg	23	6	0.25
Ebenezer landing	34	14	0.7
Sisters ferry	47	20	0.5
Parachuchla	55	24	0.5
Monkey point	70	31	0.5
Haga Slaga point	91	44	0.6
Cohens bluff	101	51	0.7
Burton ferry landing	116	60	0.6
Brown landing	130	69	0.6
Rattlesnake camp	141	77	0.7
Blue bluff	150	80	0.3
Demerief ferry	161	87	0.6
Eagle point	170	92	0.6
Hill landing	180	98	0.6
Mason landing	191	103	0.5
Augusta	203	110	0.6
Little River shoals	225	203	4.2
Point Lookout shoals	235	256	5.3
Petersburg, Ga	259	289	1.4
	265	306	2.8
Head Hell sluices	272	380	10.6
Moseley ferry	278	405	4.2
Harper ferry	284	422	2.8
Dooley ferry	306	541	5.4
Andersonville	314	577	4.5

OCONEE RIVER.

This is one of the main branches of the Altamaha River in Georgia. It heads on the eastern slope of the Blue Ridge and flows nearly southeast to its junction with the Altamaha. Its profile is remarkably smooth, with little variation from a normal one. It is from levels by the Corps of Engineers, U. S. A.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	83	
Chaney ferry	6	88	0.8
McArthur landing	15	99	1.2
Adams landing	25	109	1.0
Savannah, Americus and Montgomery R. R. crossing	30	114	1.0
Adams landing	37	121	1.0
Odam landing	39	123	1.0
Dixon landing	45	129	1.0
Walton landing	50	134	1.0
Davis landing	55	138	0.8
Branch landing	58	141	1.0
Cooper landing	62	145	1.0
Walton landing	67	151	1.2
Pritchett landing	70	154	1.0
Clark landing	72	156	1.0
Dublin	79	161	0.7
Blackshears ferry	85	167	1.0
Kittrell landing	93	175	1.0
Thompson ferry	98	179	0.8
Ball ferry	102	185	1.5
Central R. R. bridge	108	193	1.3
Spring Lake	114	202	1.5
Whitaker Island	127	221	1.5
Tucker ferry	137	231	1.0
Milledgeville	147	242	1.1
Georgia R. R. bridge	149	248	3.0
Crossing Georgia R. R	209	335	1.5
Crossing N. E. R. R. near Athens	249	604	6.7
Crossing N. E. R. R. near Lula	294	1,232	13.9

APALACHICOLA AND CHATTAHOOCHEE RIVERS.

The Chattahoochee, the main branch of the Apalachicola River, heads in the Blue Ridge, in northeast Georgia, flows southwest to the boundary between this State and Alabama, following that boundary to the south line of the State, near which it joins Flint River to form the Apalachicola. The river leaves the metamorphic region and crosses the Fall Line at Columbus, the head of navigation. Just above this place is a succession of rapids and falls, giving the river a descent of 120 feet within 5 miles of Columbus.

The profile is taken mainly from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth of Apalachicola River	0	0	
Columbus	400	238	0.6
	405	358	24.0
West Point	434	600	8.3
Morns ferry	512	700	1.3
Lizzie	537	750	2.0
	554	800	2.9
Terry ferry	586	900	3.1
Stringer ford	615	989	3.1
Crowder ford	627	1,100	9.3
	643	1,200	6.25
Mouth of Spoiled Cane Creek	653	1,500	30.0
Head	661	3,500	250.0

COOSA AND TALLAPOOSA RIVERS.

Alabama River, one of the two main branches of Mobile River, divides just below Montgomery, Alabama, into two large branches, Coosa and Tallapoosa rivers. The former heads in northern Georgia, in the broken hills which form the southern end of the Appalachian Mountains in two branches, the Etowah and the Oostanaula rivers. The Tallapoosa River heads in northwest Georgia.

The entire drainage basin of the Alabama is 23,820 square miles.

The profile is from levels of the Engineer Corps, U. S. A.

COOSA RIVER.

Locality.	Distance from Wetumka bridge.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Wetumka bridge	0	148	.....
Thompson ferry	19	244	5.1
Zimmerman ferry	31	276	2.7
Narrows	46	383	7.1
Foot of Steamboat Island	58	406	1.9
Bullock Island	64	413	1.2
Tallasseehatchie Creek	76	415	0.2
Glover ferry	85	423	0.9
Griffith ferry	96	453	2.7
Truss ferry	108	469	1.3
Embry ferry	115	471	0.3
Greensport	141	500	1.1
	160	521	1.1
Garrett ferry	207	571	1.1
Cedar bluff	223	623	3.3
Rome	271	652	0.6

ETOWAH RIVER.

[This profile is made up mainly from the atlas sheets of the United States Geological Survey.]

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, Rome	0	652	.....
Cartersville	43	696	1.0
Mouth of Little River	63	798	5.1
Chamlee ferry	83	900	5.1
Ledbetter bridge	104	1,000	4.8
Dougherty	119	1,100	6.7
	122	1,200	33.3
	131	1,300	11.1
Head	144	3,500	169.2

OOSTANAULA RIVER AND COOSAWATTEE RIVER.

[This profile is made up from atlas sheets of the United States Geological Survey.]

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, Rome	0	652	
Foot of mountains	67	700	0.7
	73	1,000	50.0
	83	1,200	20.0

BLACK WARRIOR RIVER.

This is a large eastern branch of Tombigbee River, one of the two forks of Mobile River. It heads in northern Alabama and flows southwest to its junction with the Tombigbee.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Tuscaloosa	0	0	
Langston	13	45	3.5
Patton ferry	32	107	3.3
Mouth of Locust Fork	47	120	0.9
Tuggle landing	70	144	1.0
Junction Sipsey and Mulberry forks	90	163	0.95

TALLAPOOSA RIVER.

[This profile is made from atlas sheets of the United States Geological Survey.]

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	160	
Bosworth	90	500	3.8
Malone ferry	106	582	5.1
Mouth of Little Tallapoosa River	122	660	4.9
	148	800	5.4
Muscadine	181	900	3.0
	200	1,000	5.3
Allgood mill	215	1,154	10.3

TEXAS RIVERS.

The rivers of Texas, the Trinity, Brazos, Colorado, and Nueces, and their branches, drain a territory whose physiographic features affect all its streams in a similar manner. The region slopes with much uniformity toward the southeast and the streams flow down this slope. It is formed of a succession of rock beds, dipping gently southeast, but more steeply than the slope of the land, so that on following down one of these streams we cross successively more recent strata. These beds are not of uniform hardness, and the streams, cutting more rapidly in the softer beds and being retarded by the harder ones, exhibit a succession of gentle and rapid courses. This is excellently shown in the Brazos and Colorado rivers.

These profiles were made up from atlas sheets of the United States Geological Survey.

TRINITY RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
Crossing of H. E. & W. T. R. R	72	50	0.7
Sixteen miles below Dallas	314	350	1.2
Twelve miles above Dallas	342	400	1.8
Six miles below Fort Worth	361	500	5.3
Weatherford	404	1,000	11.6

BRAZOS RIVER AND CLEAR FORK.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
Bolivar landing	51	2	
Mouth of Cow Creek	60	9	0.8
Crossing G. C. & S. F. R. R	66	22	2.2
Richmond	89	47	1.1
Eighteen miles above Waco	291	400	1.7
	318	450	1.85
	341	500	2.2
	374	600	3.0
	407	700	3.0

BRAZOS RIVER AND CLEAR FORK—continued.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Near Palo Pinto	462	800	1.8
	521	900	1.7
	545	1,000	4.2
	572	1,100	3.7
Near Fort Griffin	592	1,200	5.0
	621	1,400	6.2
	642	1,500	4.8
Newsom	675	1,650	4.5
Roby	710	1,900	7.1

COLORADO RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
	145	300	2.1
Above Bastrop	175	350	1.7
Below Austin	205	400	1.7
Dam above Austin	217	450	4.2
	229	500	4.2
	261	600	3.1
Marble Falls	297	700	2.8
Mouth of Llano River	315	800	5.6
	329	900	7.1
	341	1,000	8.3
	371	1,100	3.3
	424	1,200	1.9
	468	1,300	2.3
	498	1,400	3.3
	524	1,500	3.8
	548	1,600	4.2
	569	1,700	4.7
	591	1,800	4.5

LLANO RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	800	
Llano	27	1,000	7.4
	48	1,200	9.5
	84	1,500	8.3

SAN SABA RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	1,120	
Above San Saba	14	1,200	5.7
	37	1,400	8.7
	61	1,600	8.3
Fort McKavett	111	2,100	10.0

CONCHO RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	1,500	
Above Paint Rock	22	1,600	4.5
	30	1,700	12.5
San Angelo	43	1,800	7.7
	55	1,900	8.3
	66	2,000	9.1
	83	2,200	11.7

NUECES RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
Northern part of Zavalla County	230	700	3.1
	256	1,000	11.5
Northwestern part of Uvalde County	275	1,250	13.2
Barksdale	292	1,500	14.7
	310	1,750	13.8

RIO GRANDE.

The Rio Grande rises in the San Juan Mountains of Colorado and has a steep descent in a mountain canyon to San Luis Valley. In this broad valley its slope is greatly reduced, but increases again in the canyon in southern Colorado and northern New Mexico, which it has cut in a volcanic mesa. Flowing out of this it runs southward for several hundred miles in a valley, in which its slope is fairly uniform. It increases again in the canyon above the mouth of the Pecos, diminishing again below that point toward its mouth, where it becomes very slight.

The river is subject to wide variations in volume at different times of the year. From southern New Mexico to the mouth of the Pecos it is often dry in late summer, while in the springtime it is a powerful torrent.

The Pecos, its main branch, heads in the mountains above Las Vegas and flows southeastward over the plains and through a broad valley to its mouth. Its profile, although evidently controlled largely by the slopes of the surface, is nearly normal, but shows a decided irregularity in the increased slope near its mouth.

The profile of the Rio Grande has been made up mainly from the atlas sheets of the United States Geological Survey, that of the Pecos in part from railroad levels and in part from these atlas sheets.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
	250	440	1.8
	420	960	3.1
	722	2,500	5.1
	765	2,600	2.3
	783	2,700	5.6
	798	2,800	6.7
	816	2,900	5.6
	829	3,000	7.7
	843	3,100	7.1
	878	3,200	2.8
	902	3,300	4.1
	916	3,400	7.1
	956	3,500	2.5
	992	3,600	2.7
El Paso	1,030	3,700	2.6

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Earlham	1,069	3,800	2.6
	1,099	3,900	3.3
	1,153	4,120	4.1
Alamocita	1,197	4,250	2.9
San Marcial	1,233	4,400	4.2
Albuquerque	1,374	4,900	3.5
Bernalillo	1,396	5,000	4.5
Cochiti	1,420	5,200	8.3
San Ildefonso	1,450	5,500	10.0
Rinconada	1,480	5,829	10.9
	1,508	6,357	18.9
Colonas ferry	1,552	7,443	24.7
Del Norte	1,626	7,742	4.0
Wagon Wheel gap	1,656	8,450	23.6
San Juan	1,681	9,000	22.0
Mouth of Lost Trail Creek	1,756	9,500	6.7
Mouth of Pole Creek	1,765	10,790	143.3
Head	1,770	12,000	242.0

PECOS RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	1,000	.....
Pecos	215	2,550	7.2
Eddy	300	3,107	6.6
Hagerman	375	3,400	3.9
Crossing P. V. R. R.	405	3,500	3.3
Latitude 35°	530	4,600	8.8
Las Colonias	548	4,850	13.9
La Junta	556	4,950	12.5
	567	5,100	13.6
Anton Chico	577	5,250	15.0
La Cuesta	597	5,800	27.5
San Miguel	607	6,000	20.0
	622	6,500	33.3
	637	7,000	33.3
	657	8,000	50.0
Head	663	12,000	666.7

MISSISSIPPI RIVER.

The Mississippi River heads in Lake Itasca, or rather in the indefinite divide a few miles farther south. For several hundred miles its course is through a region over which the great northern glacier scattered its deposits, producing great irregularity in the disposition of the drainage. In this part of its course the river is very irregular, both in direction and in slope, flowing through numerous lakes of considerable size, and between them having rapids and falls. The most notable of the falls in the upper part of its course is that of St. Anthony, at Minneapolis, where the river flows off a bed of St. Peter sandstone. Below this fall its course becomes much more regular. It flows through Lake Pepin, where it has no appreciable descent, and there are no rapids of importance until those of Rock Island, Illinois, are reached, and these, with the rapids at Keokuk, are the only serious obstructions to navigation below Minneapolis. In each of these cases the rapids were produced by a recent shift in the river channel, caused by the Laurentian glacier.

The slope of the river as far as Cairo does not vary greatly, ranging from two feet to eight-tenths of a foot per mile. Most of the way the river flows in a bottom land of considerable breadth, generally widening downward, and the river becomes more and more crooked and winding.

Below Cairo, where it is joined by the Ohio, its character is that of a graded stream. Although its slope is not materially diminished, its bottom lands become broader, and within them it meanders widely from bluff to bluff. In southern Louisiana it changes again; its course becomes straighter, it deposits more detritus than it receives, and in consequence it has built up its bank by overflow, forming a broad, gently sloping ridge of dry land which accompanies it through the swamp in which its course lies. Below the mouth of Red River it forms distributaries which aid in carrying off its surplus water in times of flood. In this part of its course its slope is scarcely appreciable, and yet it flows with a strong current.

It discharges into the gulf through a delta composed of several arms or passes—South Pass, Southwest Pass, Pass a l'Outre, etc. Its entire drainage basin comprises 1,240,039 square miles.

The profile is from the levels of the Mississippi River Commission; the heights are those of ordinary low water.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
Carrollton, La	140	1	
College Point, La	194	2	
Plaquemine, La	222	2	
Baton Rouge, La	245	3	
Port Hickory, La	287	3	
Mouth of Red River, Ark	316	7	0.0
Natchez, Miss	378	21	0.2
St. Joseph, La	449	36	0.2
Vicksburg, Miss	487	48	0.3
Lake Providence, La	555	73	0.4
Greenville, Miss	618	93	0.3
Arkansas City, Ark	658	100	0.2
Mouth of White River, Ark	700	114	0.3
Helena, Ark	791	147	0.4
Mahoons landing, Miss	821	163	0.5
Memphis, Tenn	862	185	0.5
Fulton, Tenn	922	212	0.5
Cottonwood Point, Mo	974	230	0.3
New Madrid, Mo	1,028	256	0.5
Columbus, Ky	1,076	271	0.3
Cairo, Ill	1,097	274	0.1
Thebes, Ill	1,137	291	0.4
Fountain Bluff, Ill	1,177	313	0.5
St. Louis, Mo	1,270	380	0.7
Mouth of Missouri River, Mo	1,288	395	0.8
Grafton, Ill	1,308	405	0.5
Clarksville, Mo	1,361	433	0.5
Louisiana, Mo	1,371	437	0.4
Hannibal, Mo	1,397	450	0.5
Quincy, Ill	1,413	458	0.5
Canton, Mo	1,428	466	0.5
Gregory landing, Mo	1,439	472	0.5
Alexandria, Mo	1,445	475	0.5
Keokuk, Iowa	1,450	477	0.4
Montrose, Iowa (rapids)	1,462	500	1.9
Fort Madison, Iowa	1,470	502	0.3
Burlington, Iowa	1,492	511	0.4
Oquawka, Ill	1,505	516	0.4
Keithsburg, Ill	1,516	523	0.6
New Boston, Ill	1,522	524	0.2

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Port Louisa, Iowa	1,530	526	0.3
Muscatine, Iowa	1,544	530	0.3
Rock Island, Ill	1,571	542	0.4
Le Claire, Iowa (rapids)	1,587	562	1.2
Clinton, Iowa	1,608	566	0.2
Savanna, Ill	1,629	572	0.3
Bellevue, Iowa	1,649	578	0.3
Dubuque, Iowa	1,672	585	0.3
Cassville, Wis	1,699	599	0.5
Prairie du Chien, Wis	1,727	604	0.2
Lansing, Iowa	1,756	612	0.3
Brownsville, Minn	1,782	622	0.4
La Crosse, Wis	1,791	628	0.7
Winona, Minn	1,821	637	0.3
Fountain, Wis	1,829	644	0.9
Minneiska, Minn	1,839	650	0.6
Alma, Wis	1,849	656	0.6
Wabasha, Minn	1,857	662	0.8
Red Wing, Minn., Lake Pepin	1,888	665	0.1
Hastings, Minn	1,911	671	0.3
St. Paul, Minn	1,937	683	0.5
Mouth of Minnesota River, Minn	1,943	688	0.8
Minneapolis, Minn. (St. Anthony falls)	1,952	794	11.8
Anoka, Minn	1,970	825	1.7
Mouth of Elk River, Minn	1,985	851	1.7
Monticello, Minn	1,997	891	3.3
Clearwater, Minn	2,015	936	2.5
St. Cloud, Minn	2,025	965	2.9
Watab, Minn	2,033	1,001	4.5
Mouth of Platte River, Minn	2,045	1,026	2.1
Little Falls, Minn	2,060	1,090	4.3
Mouth of Crow Wing River, Minn	2,085	1,145	2.2
Brainerd, Minn	2,095	1,150	0.5
Aitkin	2,128	1,190	1.2
Foot Grand Rapids	2,182	1,248	1.1
Mouth of Leech Lake River	2,210	1,281	1.2
Lake Winnebagoshish	2,222	1,290	0.8
Lake Pemidgi	2,263	1,355	1.6
Lake Itasca	2,296	1,462	3.2

OHIO RIVER.

Ohio River drains nearly all of the Allegheny Plateau from New York to Alabama. Its two head branches, the Allegheny and Monongahela, head respectively in southern New York and in West Virginia, and both these streams have a rapid descent to their point of junction at Pittsburg. From that point to Cairo, the mouth of the Ohio, the slope of the river is gentle, being, on an average, much less than that of the Mississippi between Minneapolis and Cairo. Its long course of over 963 miles is broken by only one fall of importance, that at Louisville. Its drainage basin, including all its branches, is 201,720 square miles.

Its branches upon the left come out of the Allegheny Plateau. Of these streams one, however, Kanawha River, heads far to the southeast of the plateau among the high mountains of western North Carolina, and after a tortuous and irregular course in these mountains and among the valley ridges under the name of New River, it crosses the Allegheny Front and cuts a tremendous gorge through the plateau. Just below its junction with the Gauley, its principal tributary, it flows over Kanawha Falls, caused by the presence of a bed of hard sandstone, lying nearly horizontal. From the foot of these falls its slope is greatly reduced, so that it is navigable to this point. The Greenbrier and Gauley, which are its main tributaries, have steep and irregular profiles. The Guyandot, Big Sandy, and Little Kanawha rivers, all of which are tributaries of the Ohio on the left, head in the Allegheny Plateau and flow down canyons which they have cut in it.

The profiles of the Ohio, Allegheny, and Clarion are from levels by the Corps of Engineers, U. S. A. That of the Ohio refers to ordinary low water.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Cairo, Ill	0	277	.....
Hillerman, Ill	27	281	0.1
Paducah, Ky	47	284	0.2
Smithland, Ky	60	286	.....
Bay City, Ill	70	287	0.1
Golconda, Ill	80	290	.....
Rosiclare, Ill	91	290	0.1
Weston, Ky	107	295	.....
Caseyville, Ky	111	297	.....
Shawneetown, Ill	123	301	0.3
Raleigh, Ind	130	302	.....
Uniontown, Ky	140	306	.....

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet..*	*Feet.*
Mount Vernon, Ind	153	308	0. 2
West Franklin, Ind	165	312	.....
Henderson, Ky	178	316	0. 3
Evansville, Ind	190	318	.....
Newburg, Ind	204	320	0. 2
Enterprise, Ind	219	326	.....
Owensboro, Ky	226	328	0. 4
Rockport, Ind	235	330	.....
Grandview, Ind	240	331	.....
Lewisport, Ky	244	333	.....
Troy, Ind	252	335	0. 3
Tell City, Ind	356	337	.....
Hawsville, Ky	260	348	.....
Cloversport, Ky	272	340	0. 3
Stevensport, Ind	283	340	.....
Derby, Ind	292	343	.....
Concordia, Ky	297	346	0. 2
Reno, Ind	301	346	.....
Alton, Ind	305	347	.....
Leavenworth, Ky	319	349	.....
New Amsterdam, Ind	327	353	0. 2
Mauckport, Ind	336	354	.....
Brandenburg, Ky	338	356	.....
New Albany, Ind	374	367	0. 3
Louisville, Ky	378	394	6. 7
Utica, Ind	386	395	.....
Herculaneum	396	399	.....
Bethlehem, Ind	405	399	0. 2
Madison, Ind	423	401	.....
Carrollton, Ky	435	404	0. 2
Vevay, Ind	443	408	.....
Florence, Ind	452	411	.....
Warsaw, Ky	454	411	.....
Patriot, Ind	462	413	0. 3
Rising Sun, Ind	474	420	.....
Aurora, Ind	482	425	.....
Lawrenceburg, Ind	486	425	0. 5
Taylorsville, Ky	498	429	.....
Anderson Ferry, Ky	504	429	.....
Cincinnati, Ohio	511	431	0. 2
New Palestine, Ohio	528	437	.....

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
New Richmond, Ohio	532	438	.....
Point Pleasant, Ohio	537	439	0.3
Moscow, Ohio	540	439	.....
Neville, Ohio	544	440	.....
Chilo, Ohio	549	441	.....
Utopia, Ohio	553	442	.....
Augusta, Ky	556	444	.....
Higginsport, Ohio	558	445	.....
Dover, Ohio	564	446	.....
Ripley, Ohio	566	447	.....
Maysville, Ky	576	448	0.2
Manchester, Ohio	587	451	.....
Wrightsville, Ohio	593	454	.....
Rome, Ohio	600	457	0.4
Buena Vista, Ohio	611	460	.....
Rockport, Ky	614	461	.....
Quincy, Ky	618	464	.....
Portsmouth, Ohio	630	468	0.4
Sciotoville, Ohio	638	472	.....
Greenup, Ky	651	478	.....
Ironton, Ohio	660	483	0.5
Ashland, Ky	665	486	.....
Ceredo, W. Va	672	490	.....
Haskelville, Ohio	690	501	0.6
Miller, Ohio	692	501	.....
Gallipolis, Ohio	717	511	0.4
Ravenswood, W. Va	744	544	.....
Portland, Ohio	749	546	1.1
Parkersburg, W. Va	780	564	0.6
Marietta, Ohio	792	570	0.5
Newport, Ohio	807	579	.....
New Matamoras, Ohio	822	588	.....
Sistersville, W. Va	826	590	0.6
Moundsville, W. Va	861	614	.....
Wheeling, W. Va	871	622	0.7
Burlington, Ohio	875	628	.....
Warrenton, Ohio	882	632	.....
Wellsburg, W. Va	889	635	.....
Steubenville, Ohio	896	641	0.8
Wellsville, Ohio	915	656	.....
East Liverpool, Ohio	920	657	0.7
Vanport, Pa	935	669	.....
Baden, Pa	942	673	0.7
Pittsburg, Pa	963	702	1.4

ALLEGHENY RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, Pittsburg	0	696	.....
Sharpsburg	5	704	1.6
Pittsburg waterworks	7	710	3.0
Springdale	17	721	1.1
Tarentum	22	728	1.4
Freeport	30	744	2.0
Mouth of Mahoning River	55	797	2.1
Mouth of Red Bank River	64	821	2.7
Mouth of Clarion River	85	862	2.0
Mouth of East Sandy Creek	118	953	2.8
Mouth of French Creek	123	969	3.2

CLARION RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	862	.....
Big falls	3	882	6.7
Turnip Hole	12	932	5.6
Callensburg	18	992	10.0
Clarion	32	1,042	3.6
Mill Creek	38	1,062	3.3
State road	42	1,080	4.5
Hemlock	46	1,095	3.8
Cooksburg	48	1,114	9.5
Clarington	53	1,156	8.4
Millstone	58	1,181	5.0
Spring Creek	69	1,255	6.7
Peach Bottom	80	1,328	6.6
Portland shoals	86	1,378	8.3

ROUGH RIVER.

[From levels of the Corps of Engineers, U. S. A.]

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, Livermore	0	0	
Hartford	28	17	0.6
Hedge River	45	31	0.8
Comb of Hines dam	55	44	1.3
Comb of Landrum dam	72	57	0.8
Comb of Greens dam	81	79	2.4
Frank mill	105	89	0.4
Lampton mill	114	101	1.3

BIG SANDY RIVER.

[From levels by the Corps of Engineers, U. S. A.]

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Catlettsburg	0	488	
White Creek landing	8	502	1.8
Turnam ferry	13	504	0.4
Louisa	26	515	0.9

LOUISA FORK.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Louisa	0	515	
Peach Orchard	17	539	1.4
Red House shoal	27	563	2.4
Paintville	36	576	1.4
Prestonburg	52	596	1.3
Lanesville	72	627	1.6
Piketon	87	649	1.5

TUG FORK.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Louisa	0	515	
Falls, head	11	538	2.1
Double shoal	20	551	1.4
Warfield	35	577	1.7

GUYANDOT RIVER.

[From levels by the Corps of Engineers, U.S.A.]

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	497	
Rogers mill	13	523	2.0
Salt Rock dam	25	539	1.3
Falls	31	549	1.7
Laurel shoals	42	562	1.2
Lambert mill	54	584	1.8
Big Creek shoal	64	599	1.5
Peck mill	75	627	2.5
Logan	82	645	2.6

KANAWHA AND NEW RIVERS.

[From levels by the Corps of Engineers, U.S.A.]

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth at Point Pleasant	0	510	
Eighteen-mile ripple	18	517	0.4
	25	524	1.0
	36	532	0.7
Near St. Albans	44	540	1.0
Tyler shoal	55	549	0.8
Charleston	58	555	2.0
Brownstown	68	557	0.2

KANAWHA AND NEW RIVERS—continued.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Cabin Creek	74	565	1.3
Paint Creek	80	572	1.2
Cannelton	85	585	2.6
Foot of Kanawha falls	95	617	3.2
Mouth of Gauley River	98	650	11.0
	117	1,000	18.4
	129	1,100	8.3
	143	1,200	7.1
	155	1,300	8.3
	172	1,400	5.9
Mouth of East River	193	1,500	4.8
Ripplemead	211	1,600	5.6
Churchwood	229	1,700	5.6
	253	1,800	4.2
Mouth of Reed Creek	280	1,900	3.7
	293	2,000	7.7
	299	2,100	16.6
	306	2,200	14.3
Daughten ford	330	2,300	4.2
Bridle Creek	348	2,400	5.6
Weaversford, forks	356	2,500	12.5
	376	2,600	5.0
	392	2,700	6.3

GAULEY RIVER.

[From the atlas sheets of the United States Geological Survey.]

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	650	
	10	700	5.0
	15	800	20.0
	19	900	25.0
	23	1,000	25.0
	26	1,100	33.3
	30	1,200	25.0
	33	1,300	33.3
	37	1,400	25.0
	40	1,500	33.3
	45	1,600	20.0
	49	1,700	25.0
	56	1,800	14.3
	60	1,900	25.0
	65	2,000	20.0
	74	2,100	11.1
	83	2,200	11.1
	93	2,300	10.0
	95	2,400	50.0
	99	2,500	25.0
Head	109	4,000	150

GREENBRIER RIVER.

[From the atlas sheets of the United States Geological Survey.]

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, Hinton	0	1,350	
	5	1,400	10.0
	17	1,500	8.3
	31	1,600	7.1
Near Caldwell	48	1,700	5.9
	51	1,800	33.3
	69	1,900	5.6
	86	2,000	5.9
	97	2,100	9.1

LITTLE KANAWHA RIVER.

[From levels by the Corps of Engineers, U. S. A.]

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Parkersburg	0	564	
Leachtown	14	579	1.1
Elizabeth	26	601	1.8
Buffington shoals	44	613	0.7
Nailor bend	54	628	1.5
Mouth of Anna Maria Creek	64	640	1.2
Mouth of Pine Creek	76	655	1.3
Grantsville	78	661	3.0
Acre Island	86	672	1.4
Cedar Creek	96	688	1.6
Glenville	103	696	1.1
Stout mill	114	724	2.5
Lumberport	122	742	2.3
Bulltown	130	761	2.4

TENNESSEE RIVER.

Tennessee River heads in many branches, under a variety of topographic conditions, in the Appalachian Valley and in the mountains of western North Carolina. Certain of the heads of the Tennessee—the Hiwassee, the Little Tennessee with its branches, the Nantahala, Tuckaseegee, Big Pigeon, French Broad, and Nolichucky—rise in this region. Among the mountains their courses are steep, and they emerge into the Appalachian Valley through gorges cut in the Great Smoky range. Below these gorges their slopes are comparatively gentle.

Other of its head streams, including the Holston, with its branches, and the Clinch and Powell rivers, head in southwest Virginia in the Appalachian Valley, and their courses, for the most part, follow down secondary valleys on limestone formations, in which they have established gentle slopes. Here and there, however, these streams cut their way across valley ridges from one of these secondary valleys to its neighbor, and in these water gaps the uniformity of their slopes is interrupted and rapids and falls result.

Tennessee River is formed by the union of the Holston and French Broad rivers, a few miles above Knoxville. From the point of junction it flows southwest down the Appalachian Valley to Chattanooga. Here it turns abruptly westward, cutting through the Cumberland

Plateau. A few miles below, it receives the waters of Sequatchie River. This stream flows in a southwest course throughout, draining a portion of the plateau.

The Tennessee River below Knoxville has a gentle slope, averaging not more than a foot to a mile as far as Mussel shoals. Here the river flows over a succession of beds of hard limestone, which have retarded its work of erosion and given rise to rapids known as Big and Little Mussel and Colbert shoals. Below the latter the river has a very slight fall, averaging only about three-tenths of a foot to a mile.

The drainage basin of Tennessee River, including all its branches, is 43,897 square miles.

The profile of Tennessee River is from levels by the Corps of Engineers, U. S. A. Those of its branches, the Sequatchie, Hiwassee, Little Tennessee, Nantahala, Tuckaseegee, French Broad, Big Pigeon, Nolichucky, Holston, Powell, and Clinch rivers, have been made up from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Paducah	0	286	.....
Johnsonville	95	315	0.3
Riverton	225	358	0.3
Colbert shoals	233	384	3.3
Florence	255	396	0.6
Little Mussel shoals	259	418	5.5
Lock No. 1	275	503	5.3
Lock B	283	509	0.8
Milton bluff	285	523	7.0
Decatur	303	529	0.3
Guntersville	347	531	0.1
Bridgeport	402	593	1.1
Shellmound	412	598	0.5
The Skillet	436	606	0.3
The Suck	440	613	1.8
Chattanooga Creek	448	626	1.6
Chattanooga	452	631	1.3
Charleston	508	684	0.9
Rockwood	541	699	0.5
Kingston	556	712	0.9
Loudon	579	736	1.0
Knoxville	635	806	1.3
Head, junction Holston and French Broad rivers	639	810	1.0

SEQUATCHIE RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	595	
Near Dunlap, Tenn	32	700	3.3
	45	800	7.7
	61	900	6.25
	71	1,000	10.0

HIWASSEE RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	662	
Bean Mountain Canyon	36	700	0.9
Narrows	50	1,000	21.4
	54	1,200	50.0
Murphy	84	1,500	10.0
Hayesville	105	1,800	14.3
Above Hiwassee	116	2,000	18.2
Head	126	3,800	180.0

LITTLE TENNESSEE RIVER.

Locality.	Distance from mouth.	Height above. sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth at Lenoir, Tenn	0	750	
Morgantown	12	800	4.2
	35	900	4.3
	40	1,000	20.0
	43	1,100	33.3
	47	1,200	25.0
	55	1,300	12.5
	65	1,400	10.0
Mouth of Tuckaseegee River	71	1,500	16.6
Mouth of Nantahala River	77	1,550	8.3
	82	1,700	30.0
Above Franklin	104	2,000	13.6
Rabun Gap, head	118	2,200	14.3

NANTAHALA RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	1,550	
	6	1,700	25.0
	11	2,000	60.0
	17	2,500	83.3
	25	3,000	40.0
Head	40	4,200	80.0

TUCKASEEGEE RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	1,500	
Bryson	10	1,753	15.3
Dillsboro	27	2,000	14.5
Tuckaseegee	39	2,184	15.3
	48	2,700	57.3

FRENCH BROAD RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet*
Mouth, Knoxville	0	810	
	38	1,000	5.0
Delrio	49	1,100	9.1
Paint Rock	56	1,200	14.3
Barnard	76	1,500	15.0
Alexander	92	1,800	18.7
Above Asheville	111	2,000	10.5
Horseshoe	128	2,100	5.8
	160	2,200	3.1
Sassafras gap, head	169	2,800	66.6

BIG PIGEON RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	980	
	6	1,000	3.3
	16	1,100	6.2
State line, Tennessee and North Carolina	24	1,200	12.5
	26	1,300	50.0
	30	1,400	25.0
	34	1,500	25.0
	38	1,600	25.0
	43	1,700	20.0
	49	1,800	16.6
	50	1,900	100.0
	51	2,000	100.0
	54	2,100	33.3
	55	2,200	100.0
	56	2,300	100.0
	58	2,400	50.0
	69	2,500	9.1
	74	2,600	20.0
	80	2,700	16.6
Head	91	5,500	254.5

NOLICHUCKY RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	975	
	30	1,100	4.2
Bird bridge	45	1,200	6.6
Henshaw	53	1,300	12.5
	63	1,400	10.0
Near Conkling	75	1,500	8.3
	85	1,600	10.0
	90	1,700	20.0
	94	1,800	25.0
	96	1,900	50.0
	99	2,000	33.3
	101	2,100	50.0
	102	2,200	100.0
	104	2,300	50.0
Junction North and South Toe rivers	118	2,400	7.1
	123	2,500	20.0
	140	3,000	29.4
Head South Toe River	143	5,000	666.6

HOLSTON RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, near Knoxville	0	810	
Near Morristown	78	900	1.2
Spears	105	1,000	3.7
	117	1,100	8.3
Rotherwood	143	1,156	2.2

SOUTH FORK OF HOLSTON RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	1,156	
	11	1,200	4.0
Mouth of Watauga River	16	1,300	20.0
Bluff	28	1,400	8.3
	41	1,500	7.7
Mouth of Fifteen-mile Creek	54	1,700	15.4
Mouth of Middle Fork	62	1,900	25.0
	74	2,100	16.6
	86	2,500	33.3

NORTH FORK OF HOLSTON RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, Rotherwood	0	1,156	
	11	1,200	4.0
	21	1,300	10.0
	37	1,400	6.25
	50	1,500	7.7
	64	1,700	14.3
	82	2,000	16.6
Head	92	3,000	100.0

MIDDLE FORK OF HOLSTON RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	1,900	
Seven-mile ford	24	2,000	8.3
Head	44	2,500	25.0

POWELL RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	900	
	33	1,000	3.03
	61	1,100	3.6
Near Jonesville, Va	91	1,200	3.3
	103	1,300	8.3
Big Stone Gap	117	1,500	14.3
Near Norton	129	2,000	41.6

CLINCH RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, Kingston	0	712	
Clinton	52	800	1.7
Near Mouth of Powell River	88	900	2.8
	116	1,000	3.6
Sneedville	128	1,100	8.3
	155	1,200	3.7
Dungannon	177	1,300	4.5
Near St. Paul	187	1,400	10.0
Artrip	207	1,500	5.0
	234	2,000	18.5
Near Tazewell	249	2,500	33.3

CUMBERLAND RIVER.

Cumberland River heads in the Cumberland Plateau in southeastern Kentucky and flows southwestward in a broad curve down into Ten-

nessee, and thence northwestward to its junction with the Ohio. The steep slope near its head is quickly reduced, and over much the greater part of its course its average descent is scarcely 1 foot to a mile, although it is interrupted in several places by slight rapids.

Its drainage basin comprises 18,573 square miles.

The profile is mainly from levels of the Engineer Corps, U. S. A.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	286	.....
C. O. & S. W. R. R. bridge	30	293	0.2
Glenwood landing	34	294	0.3
Eddyville	42	296	0.3
Commerce landing	49	299	0.4
Empire landing	54	302	0.6
Blight landing	58	304	0.5
Canton	61	306	0.7
Linton	72	309	0.3
Brandon landing	81	312	0.3
Carney landing	91	319	0.7
Cumberland City	104	325	0.5
Yellow Creek towhead	109	327	0.4
Palmyra	115	328	0.2
Clarksville	126	331	0.3
Seven-mile Island	132	334	0.5
Harrison landing	143	341	0.6
Harpeth shoals	156	352	0.8
Hickman ferry	166	363	1.1
Robertson Island	177	364	0.1
Nashville	189	366	0.2
Donelson ford	206	374	0.5
Lindsey Island	223	387	0.8
Gallatin	236	392	0.4
Cunningham Island	247	399	0.6
Buzzard Island	257	404	0.5
Whitley Island	265	410	0.8
Hartsville	276	415	0.5
Bradley Island	284	423	1.0
Lovell Island	294	432	0.9
Carthage	305	440	0.7
Beasley bar	318	448	0.6
Sullivan Island	323	450	0.4
Salt Lick Island	339	461	0.7

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Tackett Island	345	466	0.8
Simpson Island	353	475	1.1
Rose bar	364	478	0.3
Butler landing	373	489	1.2
Kentucky and Tennessee boundary	386	497	0.6
Sulphur Lick shoal	393	502	0.7
Stalcup Island	407	508	0.4
Cloyd Island	410	513	1.7
Green Island	432	527	0.6
Spearman Island	439	529	0.3
Wells Island	450	535	0.5
Blankenship Island	457	542	1.0
Long Bottom Island	461	546	1.0
Belks Island	472	554	0.7
Gauns Island	487	570	1.1
Ford Island	507	580	0.5
	513	585	0.8
Point Burnside	516	586	0.3
	548	700	3.6
	558	800	10.0
Williamsburg	587	900	3.4
Prineville	645	1,000	1.7
Forks, Mount Pleasant	678	1,100	3.0

KENTUCKY RIVER.

Kentucky River, like the Big Sandy, Guyandot, and Little Kanawha, heads in the Allegheny Plateau. Its head branches have steep slopes in the plateau, becoming more gentle in the Blue Grass country.

The profile is from levels by the Engineer Corps, U. S. A.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	410	.....
Frankfort	65	452	0.6
Beattyville	254	636	1.0
Mouth, Middle Fork	258	638	0.5

MIDDLE FORK OF KENTUCKY RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	638	
Mouth of War Creek	24	681	1.8
Troublesome Creek	54	731	1.7
Brashear's salt works	120	935	3.1

NORTH FORK OF KENTUCKY RIVER.

Locality.	Distance from Leatherwood.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth of Leatherwood Creek	0	935	
Mouth of Rockhouse Creek	9	994	6.6
Gum Spring	21	1,088	7.8
Whitesburg	27	1,141	8.8
Mouth of Boone Fork	38	1,252	10.1
Pound Gap	45	2,427	167.9

SOUTH FORK OF KENTUCKY RIVER.

Locality.	Distance from Leatherwood.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Beattyville	0	636	
Booneville	12	661	2.1
Red Bird	42	767	3.5
Collins Fork	69	842	2.8

WABASH RIVER.

This branch of Ohio River, having a drainage basin of 33,725 square miles, heads in northwestern Ohio and flows west and south to its mouth, after a course of 517 miles.

The profiles of Wabash and Eel rivers were compiled by Mr. Frank Leverett.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	311	
Mouth of Little Wabash	16	323	0.8
Grayville	62	365	0.9
Mouth of White River	90	377	0.4
Vincennes	122	399	0.7
Hutsonville	168	425	0.6
State line	197	441	0.6
Terre Haute	212	448	0.5
Covington	267	470	0.4
Attica	287	487	0.9
Lafayette	312	506	0.8
Logansport	362	583	1.5
Mouth of Mississinewa River	382	636	2.7
Mouth of Salamonie River	402	667	1.6
Huntington	417	699	2.1
Source	517	1,000	3.0

EEL RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth at Logansport	0	583	
Railroad bridge in Miami County	30	688	3.5
North Manchester	45	721	2.2
Liberty mills	50	750	5.8
Collamer	58	768	2.3
Columbia	70	816	4.0
Source	85	850	2.3

MUSKINGUM RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	570	
Foot of Zanesville dam	75	674	1.4
Dresden	91	700	1.6

MIAMI RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	427	
Middleton	55	656	4.2
Dayton	77	725	3.1
Piqua	108	840	3.7
Source	158	972	2.6

ILLINOIS RIVER.

Illinois River rises near the head of Lake Michigan and flows nearly southwest to its mouth, just above Alton. The slope of this river is very slight, being much less than that of the Mississippi above the mouth of the Illinois, its fall being only 110 feet in 324 miles, or about three-tenths of a foot per mile.

The profile is from levels by the Engineer Corps, U. S. A.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	405	
Peru, Ill	261	440	0.1
Little Rock ferry	265	446	1.5
Utica, Ill	266	448	2.0
Starved Rock	268	454	3.0
Buffalo Rock	271	459	1.7
Ottawa, Ill	277	463	0.7
Marseilles, Ill	284	475	1.7
Ballards Island	285	477	2.0
Seneca, Ill	289	484	1.8
S. & K. R. R. bridge	293	486	0.5
Morris, Ill	300	492	0.9
Aux Sable township	305	496	0.8
Kankakee feeder	310	501	1.0
Adams dam	324	515	1.0
Upper dam, Joliet	325	531	16.0

ROCK RIVER.

This stream heads in southern Wisconsin and flows south and southwest to its junction with the Mississippi at Rock Island. Although its profile is gentle throughout, it affords a number of fine water powers, several of which have been improved.

Its drainage basin is 9,792 square miles.

The profile is from the report on Water Power of the Tenth Census.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth at Rock Island, Ill	0	541	.....
Mouth of Green River	12	556	1.3
Mouth of Rock Creek	36	574	0.8
Mouth of Elkhorn Creek	65	601	0.9
Mouth of Leaf River	113	669	1.4
Mouth of Kishwaukee Creek	126	692	1.8
Mouth of Pecatonica River	151	716	1.0
Mouth of Catfish River	181	773	1.9
Fort Atkinson	199	784	0.6
Outlet Lake Horicon	261	861	1.2

RED RIVER.

The Red River of Texas has its source in the northern part of the Staked Plains. Its course for several hundred miles is a little south of east, along the northern boundary of Texas. At Fulton, Arkansas, it turns southeast and retains that general course to its mouth.

Throughout most of its course this river is graded, with a slope of only a few tenths of a foot to the mile, and along the south boundary of Indian Territory its slope is less than 2 feet per mile.

The drainage basin of Red River is 89,970 square miles, and its length considerably exceeds 1,000 miles.

The profile is derived in part from the levels of the Engineer Corps, U. S. A., and in part from levels by the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	4	
Barbre landing	7	4	0.0
Black River	35	6	0.1
Ware landing	67	24	0.6
Cassandria	81	34	0.7
Casa landing	97	36	0.1
Alexandria	118	42	0.3
Colfax	152	52	0.3
Bell landing	165	58	0.5
St. Maurice	181	69	0.7
Tessier landing	188	72	0.4
Le Compte bluffs	211	86	0.6
Coushatta	237	96	0.4
Nicock bayou	273	125	0.8
Locust landing	305	131	0.2
Shreveport	327	138	0.3
Pandora bend	339	148	0.8
Cottonwood bayou	357	168	1.1
Elmer slough	375	179	0.6
Kouns canal	386	182	0.3
Blanton bluff	398	186	0.3
Collins bluff	407	188	0.2
Dukes bend landing	420	192	0.3
Booker landing	448	197	0.2
Garland	457	204	0.8
Person landing	468	208	0.4
Dobson landing	474	212	0.7
Dooley ferry	490	216	0.3
Kye Smith landing	504	221	0.4
Fulton, Ark	515	227	0.5
	705	500	1.4
	840	750	1.8
	955	1,000	2.2
	995	1,250	6.2
Western boundary of Oklahoma	1,045	1,500	5.0

OUACHITA RIVER.

The Ouachita River heads in the Ozark Hills of western Arkansas. In that part of its course which lies within the hills it flows in limestone

valleys between quartzite ridges, and has a considerable slope. Upon emerging into the level country near Arkadelphia, Arkansas, its slope greatly diminishes, and in its long course thence to its junction with Black River the fall per mile is very slight.

The profile is derived in part from levels by the Corps of Engineers, U. S. A., and in part from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	60	.....
Harrisonburg	16	67	0.4
Monroe	122	88	0.2
Mouth Bartholomew bayou	148	93	0.2
Camden	304	114	0.1
Arkadelphia	380	188	1.0
	417	300	3.0
	457	500	5.0
	476	600	5.3
	500	700	4.2
	514	800	7.1
	534	1,000	10.0
Head	545	1,750	68.2

ARKANSAS RIVER.

This large branch of the Mississippi heads in central Colorado, in the Rocky Mountains, at an altitude of 10,000 feet. It flows first south and then east, getting clear of the mountains at Canyon City, Colorado. Within the mountains its slope is extremely steep, averaging 40 feet to the mile; upon entering the plains its slope rapidly diminishes, and from Pueblo as far as the south boundary of Kansas, a distance of 500 miles, it remains almost constant, with an average slope of 7 feet per mile. In this part of its course it resembles the Platte. Although having a steep slope, it is so heavily loaded with detritus that it deposits rather than erodes. It is in effect a graded stream. From Wichita downward to its mouth its slope constantly diminishes, although not uniformly, and near its mouth it has no greater fall than the Mississippi in this neighborhood.

The drainage basin of the Arkansas is 185,671 square miles; the total length of the river is 1,497 miles.

The profile is derived as far as Argenta from levels of the Corps of Engineers, U. S. A.; thence to its head from atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	117	
Cut-off	15	118	0.1
Hopedale	22	119	0.1
Red Fork	27	121	0.4
Arkansas Post	38	130	0.8
Auburn	64	137	0.3
Little Bayou Meto	71	141	0.6
Sarassa	78	149	1.1
Bankhead	88	158	0.9
Rob Roy bridge	101	161	0.2
Pine Bluff	110	164	0.3
McAlister	121	170	0.5
Mokes landing	133	176	0.5
Red Bluff	142	188	1.3
Troy Landing	158	202	0.9
Argenta	176	216	0.8
	199	250	1.5
	249	300	1.0
	307	350	0.9
Fort Smith	403	400	0.5
Mouth of Grand River	497	500	1.1
Mouth of Cimarron River	584	652	1.7
Mouth of Black Bear Creek	646	764	1.8
Mouth of Salt Creek	661	797	2.2
Kaw Agency	723	933	2.2
Arkansas City	767	1,043	2.5
Oxford	792	1,108	2.6
El Paso	817	1,177	2.8
Wichita	832	1,222	3.0
Lyons	853	1,400	8.5
Hutchinson	871	1,500	5.6
Nickerson	889	1,600	5.6
Raymond	906	1,700	5.9
	926	1,800	5.0
	942	1,900	6.2

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Larned	958	2,000	6.2
	973	2,100	6.7
	989	2,200	6.2
	1,005	2,300	6.2
	1,020	2,400	6.7
	1,036	2,500	6.2
Cimarron	1,051	2,600	6.7
	1,066	2,700	6.7
Garden	1,081	2,800	6.7
	1,159	3,400	7.7
	1,172	3,500	7.7
Lamar	1,187	3,600	6.7
	1,200	3,700	7.7
	1,214	3,800	7.1
	1,229	3,900	6.7
Robinson	1,240	4,000	9.1
	1,254	4,100	7.1
	1,269	4,200	6.7
	1,283	4,300	7.1
	1,296	4,400	7.7
Mouth of Huerfano River	1,309	4,500	7.7
Mouth of St. Charles River	1,322	4,600	7.7
Pueblo	1,334	4,700	8.3
	1,345	4,800	9.1
	1,352	4,900	14.3
	1,359	5,000	14.3
	1,370	5,200	18.2
Canyon	1,375	5,300	20.0
Parkdale	1,385	5,700	40.0
	1,399	6,000	21.4
Mouth of South Arkansas River	1,428	6,500	17.2
	1,439	7,000	45.5
	1,457	8,000	55.6
Granite	1,475	9,000	55.6
Tennessee pass, head	1,497	10,400	63.6

CANADIAN RIVER.

This is a long branch of the Arkansas, heading in Raton pass, in northern New Mexico, and, flowing first south and then east down the slope of the plains, it joins the Arkansas in Indian Territory.

The profile is derived mainly from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	460	
	22	500	1.8
	82	600	1.7
	104	700	4.5
	134	800	3.3
	152	900	5.6
Near Purcell	190	1,040	3.7
C. R. I. & P. R. R. crossing	240	1,200	3.2
Canadian	435	2,300	5.6
Tascosa	550	3,150	7.4
	727	5,972	15.9
	745	6,292	17.8
Raton pass, head	758	7,893	123.2

NEOSHO RIVER.

Neosho River heads in Kansas, not far east of the center of the State, and flows at first eastward and then southward to its junction with the Arkansas in Indian Territory. Its course of 346 miles is mainly through a prairie region, and its profile departs but little from a normal one.

The profile is derived from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	470	
	12	500	2.5
Markham ferry, Ind. T	42	550	1.7
	69	600	1.8
Above Oswego, Kans	177	800	1.8
	206	850	1.7
Humboldt	228	900	2.3
Leroy	255	950	1.8
Ottumwa	274	1,000	2.6
Emporia	296	1,050	2.3
	310	1,100	3.6
Council Grove	326	1,200	6.25
Head	346	1,500	15.0

VERDIGRIS RIVER.

This river heads in southeastern Kansas and flows nearly south to its junction with the Neosho, in the northern part of Indian Territory. It drains a region mainly composed of prairie land. The river has slight fall except near its head, and with the exception of one point in its course it has a symmetrical profile.

The profile is derived from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	475	
	11	500	2.3
	60	550	1.02
	105	600	1.1
	133	650	1.8
	154	700	2.4
	179	750	2.0
	185	800	8.3
	206	850	2.4
	231	900	2.0
	242	950	4.5
	248	1,000	8.3
	258	1,100	10.0
	265	1,200	14.3
Head	275	1,500	30.0

WHITE RIVER.

This stream heads in northwestern Arkansas, in the Ozark Plateau, and flows southeastwardly through it in a canyon, with a steep slope. Emerging from the plateau, it flows southward through the alluvial region of southeastern Arkansas to its junction with Mississippi River, at the mouth of the Arkansas. Its slope throughout the alluvial region is extremely gentle. Its drainage basin is 27,925 square miles.

The profile is derived mainly from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	107	
Jacksonport	330	193	0.3
Grigsby ferry	380	250	1.1
	410	300	1.7
	439	350	1.7
	463	400	2.1
	487	450	2.1
	509	500	2.3
	536	550	1.9

ST. FRANCIS RIVER.

This stream heads in southeast Missouri and flows nearly south to its junction with the Mississippi, in eastern Arkansas. Nearly all its course is in low bottom lands of the Mississippi River, and its slope is extremely gentle.

The profile comes from levels by the Mississippi River Commission.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, Ark	0	144	.....
Wittsburg, Ark	135	161	0.1
Ebdy, Butler County, Mo	308	314	0.9
Ironton, Mo	438	887	4.4

MERAMEC RIVER.

This is a small branch of the Mississippi, in eastern Missouri. It heads in the Ozark Plateau, and flows generally northeastward to its mouth, just below St. Louis.

The profile is derived from levels of the Engineer Corps, U. S. A.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	365	.....
Mouth of Big River	56	407	0.8
Mouth of Bourbeuse River	84	458	1.8
Mouth of Courtois River	134	615	3.1
Head	174	755	3.5

MISSOURI RIVER.

Missouri River has its source in southwest Montana, in three large branches—the Jefferson, Madison, and Gallatin—which meet at the Three Forks. These three streams have steep descents, mainly through mountainous regions, but from its head, at the Three Forks, the Missouri has a long course down the incline of the Great Plains, with a gentle slope, which is broken at only one point—Great Falls—by a succession of falls and rapids, in the course of which it descends nearly 200 feet. Below these falls it has the characteristics of a graded river, flowing through a broad bottom land, with wide curves and numerous shifts of its course. These characteristics become more and more marked in descending the river, accompanied by a gradually diminishing slope.

Its drainage basin, including all its branches, is 527,155 square miles.

The profile of Missouri River, from its mouth to the Three Forks, in Montana, is from levels of the Missouri River Commission. Those of the Jefferson, Madison, and Gallatin rivers are from atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	395	
Jamestown landing, Mo	9	403	0.9
St. Charles, Mo	28	416	0.7
Cottleville Landing, Mo	44	437	1.3
Washington, Mo	71	458	0.8
Hermann, Mo	103	479	0.7
Fishers landing, Mo	124	502	1.1
Jefferson City, Mo	151	523	0.8
Providence, Mo	180	545	0.8
Boonville, Mo	206	564	0.7
Glasgow, Mo	237	591	0.9
New Frankfort, Mo	252	602	0.8
Dewitt, Mo	267	614	0.8
Waverly, Mo	299	645	1.0
Lexington, Mo	322	664	0.8
Camden, Mo	337	678	0.9
Missouri City, Mo	363	695	0.7
Kansas City, Mo	391	716	0.8
Leavenworth, Kans	422	742	0.8
Atchison, Kans	448	765	0.9
St. Joseph, Mo	479	790	0.8
White Cloud, Kans	525	829	0.8
Brownsville, Nebr	578	875	0.9
Nebraska City, Nebr	608	908	1.1
Plattsmouth, Nebr	634	940	1.2
Omaha, Nebr	660	960	0.8
Blair, Nebr	695	986	0.7
Decatur, Nebr	745	1,033	0.9
Sioux City, Iowa	807	1,077	0.7
Vermilion, S. Dak	855	1,131	1.1
Mouth of James River, S. Dak	888	1,150	0.6
Yankton, S. Dak	898	1,161	1.1
Running Water, S. Dak	929	1,203	1.4
Fort Randall, S. Dak	969	1,236	0.8
Chamberlain, S. Dak	1,058	1,323	1.0

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth of Cheyenne River, S. Dak	1,112	1,460	2.5
Bismarck, N. Dak	1,239	1,618	1.2
Mouth of Little Missouri River	1,371	1,740	0.9
Williston, N. Dak	1,509	1,825	0.6
Mouth of Yellowstone River, N. Dak	1,549	1,855	0.8
Mouth of Poplar River, Mont	1,647	1,935	0.8
Mouth of Milk River, Mont	1,726	2,020	1.1
Mouth of Marias River, Mont	2,052	2,545	1.6
Fort Benton, Mont	2,074	2,565	0.9
Mouth of Portage River, Mont	2,099	2,783	8.7
Great Falls, Mo	2,111	3,295	42.7
Mouth of Sunrise River, Mo	2,123	3,299	0.3
Townsend, Mo	2,295	3,793	2.9
Three Forks, Mo	2,340	4,000	4.6

JEFFERSON RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Three Forks, mouth	0	4,000	.....
	24	4,200	8.3
	56	4,400	6.3
	66	4,600	20.0

BIGHOLE RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	4,600	.....
	16	4,800	12.5
	31	5,000	13.3
	43	5,200	16.7
	54	5,400	18.2
	64	5,600	20.0

BEAVERHEAD RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	4,600	
	19	4,800	10.5
	31	5,000	16.7
	51	5,200	10.0
	61	5,400	20.0

MADISON RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Three Forks, mouth	0	4,000	
	11	4,200	18.2
	21	4,400	20.0
	29	4,600	25.0
	40	4,800	18.2
	54	5,000	14.3
	63	5,200	22.2
	69	5,400	33.3
	79	5,600	20.0

GALLATIN RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Three Forks, mouth	0	4,000	
	12	4,200	16.7
	20	4,400	25.0
	24	4,600	50.0
	28	4,800	50.0
	34	5,000	33.3
	40	5,200	33.3
	44	5,400	50.0
	51	5,600	28.6
	59	5,800	25.0
	65	6,000	33.3
	69	6,200	50.0
	73	6,400	50.0
	77	6,600	50.0
	83	6,800	33.3
	88	7,000	40.0

OSAGE RIVER.

Osage River heads in eastern Kansas, under the name of Marais des Cygnes. Its slope throughout its course, of nearly 500 miles, is very gentle; indeed, for three-fourths of it it is less than a foot to a mile. This portion of Kansas is mainly through a prairie region, and here it is interrupted by marshes. In Missouri the river is extremely winding, in great curves, which are deeply incised.

The profile is derived from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, Osage City	0	520	
Foot of Rice Island	12	524	0.3
Mouth of Big Gravois Creek	85	550	0.4
Near Crittenden	148	600	0.8
	216	650	0.7
Near Rockville	280	700	0.8
Near Pleasanton	350	750	0.7
	402	800	1.0
Ottawa	434	850	1.6
Near Melvern	486	950	1.9
Near Olivet	494	1,000	6.3

KANSAS RIVER.

The Kansas River and its branches, Smoky Hill and Republican rivers, are streams of the plains, heading in eastern Colorado and flowing down the long eastern slope of the country. Their courses are throughout gentle, although a little steeper toward the head, and less so in their lower courses.

Their drainage basins, comprising altogether 59,256 square miles, are treeless, except on the lower course of the main river.

These profiles are from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Kansas City, mouth	0	720	
Tiblow	20	754	1.7
Lawrence	50	796	1.4
Topeka	87	864	1.8
St. Mary	123	925	1.7
Wamego	139	959	2.1
St. George	150	977	1.6
Manhattan	160	996	1.9
Junction City	191	1,080	2.7
Abilene	254	1,100	0.3
Solomon	274	1,125	1.3
Salina	310	1,200	2.1
	353	1,300	2.3
	378	1,400	4.0
Ellsworth	408	1,500	3.3
	436	1,600	3.6
	463	1,700	3.7
	479	1,800	6.2
	496	1,900	5.9
	512	2,000	6.2
	528	2,100	6.2
	544	2,200	6.2
Wallace	654	3,280	9.8

REPUBLICAN RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth at Junction City	0	1,080	
Near Clay Center	38	1,200	3.2
Lawrenceburg	66	1,300	3.6
	86	1,400	5.0
	100	1,500	7.1
Near Bostwick	122	1.600	4.5
Near Red Cloud	143	1,700	4.8
Near Franklin	161	1,800	5.5
Republican	181	1,900	5.0
	199	2,000	5.5
Edson	215	2,100	6.3
	227	2,200	8.3

PLATTE RIVER.

Platte River heads in Colorado in two branches, North and South Platte. The former has its source in North Park and the mountains adjacent and has a steep descent within the mountains, dropping to 6 or 7 feet per mile when it enters the plains. The South Platte heads in the mountains at the north end of South Park and enters the plains just above Denver. Within the mountains its slope is extremely steep and irregular, but upon reaching the plains it suddenly diminishes greatly, falling to 8 or 9 feet to the mile. These two branches meet at North Platte, and below their junction the Platte has an average fall of about 6 feet per mile, maintaining that slope with remarkable uniformity. The river is a peculiar one in the fact that it has a relatively steep slope and an extremely straight course, while at the same time it is building up its bed. This peculiarity is due to the fact that it is, taking the year as a whole, an overloaded stream. It is subject to great fluctuations in volume. In the springtime, when the mountain snows are melting, it is a river a mile in width, and although rather shallow carries a large body of water, while at other times of the year it is almost or quite dry.

The drainage basin of Platte River comprises 90,011 square miles.

The profiles of the Platte and its branches are from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	940	
	15	1,000	4.0
	38	1,100	4.3
	63	1,200	4.0
	81	1,300	5.5
	101	1,400	5.0
	118	1,500	5.9
	133	1,600	6.7
Central City	149	1,700	6.3
	161	1,800	8.3
	176	1,900	6.7
	191	2,000	6.7
	206	2,100	6.7
Kearney	221	2,200	6.7
	237	2,300	6.3
Lexington	253	2,400	6.3
	270	2,500	5.9
	282	2,600	8.3
	300	2,700	5.6
North Platte	315	2,800	6.7

NORTH PLATTE RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, near North Platte	0	2,800	
	15	2,900	6.7
Camp Clark	145	3,700	6.2
	161	3,800	6.3
	177	3,900	6.3
	193	4,000	6.3
	208	4,100	6.7
Fort Laramie	226	4,200	5.5
	239	4,300	7.7
	251	4,400	8.3
	265	4,500	7.1
	275	4,600	10.0
Douglas	310	4,827	6.5
Casper	370	5,100	4.6
Fort Steele	510	6,500	10.0

SOUTH PLATTE RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, near North Platte	0	2,800	
Ogalalla	51	3,209	8.0
Big Spring	70	3,364	8.2
Denver Junction	81	3,456	8.4
Sedgwick	96	3,571	7.7
Crook	111	3,695	8.3
Iliff	127	3,820	7.8
Sterling	138	3,920	9.0
Merino	151	4,021	7.8
Snyder	168	4,160	8.2
Orchard	199	4,391	7.5
Hardin	216	4,513	7.2
Lasalle	232	4,663	9.4
Nantes	239	4,732	9.9
Platteville	244	4,807	15.0
Lupton	253	4,891	9.3
Brighton	260	4,968	11.0

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Henderson	265	5,023	11.0
Denver	288	5,170	6.4
Platte Canyon	308	5,492	16.1
South Platte	317	6,085	65.9
	332	6,500	27.7
	347	7,000	33.3
Mouth of Tarryall Creek	354	7,500	71.4
Foot of upper canyon	365	8,000	45.5
Head of upper canyon	375	8,165	16.5
	380	8,500	67.0
Mouth of Little Platte River	386	8,683	30.5
	405	9,000	16.7
Above Fairplay	415	9,500	50.0
	427	10,000	41.7

YELLOWSTONE RIVER.

Yellowstone River heads in the mountains above Yellowstone Lake, flowing into the lake at the head of its southeastern arm. On emerging from the lake the river has a very gentle slope for a few miles, then plunges over two falls, the upper fall 90 feet and the lower 325 feet. Thence follows a succession of canyons in volcanic rock, in which the river has a rapid descent. At Livingston it turns from its northern course to the east and flows through a broad valley with a diminishing slope to its mouth at Fort Buford.

The profile is in large part from the levels of the Northern Pacific Railway.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	1,855	
Diamond Island	30	1,916	2.0
Beef slough	46	1,950	2.1
Reno bend	60	1,988	2.7
Monroe rapids	100	2,100	2.8
Walker Island shoal	108	2,123	2.9
De Russy	113	2,133	2.0
White sand	124	2,160	2.5
McEwens rapids	133	2,182	2.4

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth of Powder River	137	2,200	4.5
Baker rapids	144	2,224	3.4
Buffalo rapids	163	2,300	4.0
Keogh, ferry at Tongue River	176	2,355	4.2
Benteen Island	196	2,402	2.3
Rosebud	215	2,465	3.3
Big Porcupine Creek	234	2,522	3.0
Head of Rosebud Island	252	2,583	3.4
Mouth of Bighorn River	274	2,668	3.9
Junction City	279	2,696	5.6
N. P. R. R. crossing, near Billings	331	3,079	7.4
Stillwater	373	3,560	11.5
W. P. R. R., second crossing	385	3,676	9.7
Gray Cliff	400	3,847	11.4
Big Timber	413	4,072	17.3
Springdale	427	4,190	8.4
Livingston	446	4,437	13.1
Head of lower canyon	456	4,600	16.3
Chicory	468	4,800	16.7
Foot second canyon	486	5,000	11.1
	533	6,000	21.3
Foot of lower falls	552	7,300	68.4
Top of upper falls	553	7,725	425.0
Yellowstone Lake	569	7,741	1.0

MILK RIVER.

This is a long branch of Missouri River, in northern Montana. It heads in the plains near the international boundary, and flows in a course generally a little south of east, to its mouth. Its slope conforms to that of the plains, averaging about 2 feet per mile.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	2,020	.....
Glasgow, 2 miles above	22	2,055	1.6
Malta	106	2,220	2.0
Yantic	184	2,415	2.5

JAMES RIVER.

James River, of the Dakotas, is a stream of the plains, flowing through its entire course in a region recently occupied by the great northern glacier. It heads in North Dakota and flows nearly south 433 miles, to its junction with Missouri River at Yankton. Its entire course is newly occupied and the river has made but little progress in erosion. It follows closely in its profile the slopes of the country, which are very gentle.

The profile is derived from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	1,150	
Olivet, 4 miles above	42	1,180	0.7
	64	1,200	0.9
	105	1,220	0.5
	172	1,240	0.3
	211	1,260	0.5
	265	1,280	0.4
Grand Rapids	315	1,300	0.4
Dickey, 2 miles above	326	1,320	1.8
	334	1,340	2.5
	348	1,360	1.4
Jamestown, 3 miles below	358	1,380	2.0
Jim Lake	382	1,435	2.3
Arrowhead Lake	394	1,440	0.4
New Rockford	433	1,502	1.6

DES MOINES RIVER.

This river heads in southwest Minnesota and flows in a southeast course across Iowa to its junction with the Mississippi at Keokuk. Its slope is gentle throughout its course and fairly uniform.

Its drainage basin is 14,652 square miles.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, Keokuk, Iowa	0	476	
Ottumwa, Iowa	94	636	1.7
Des Moines, Iowa	205	786	1.4
Moingona, Iowa	245	877	2.3
Southeast part of Webster County, Iowa	269	921	1.8
Fort Dodge, Iowa	300	964	1.4
Windom, Minn	411	1,329	3.3

IOWA RIVER.

This branch of the Mississippi heads in northern Iowa and flows southeast to its mouth. Its course is through a prairie region and its slope is gentle throughout.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	522	.....
Iowa City	60	607	1.4
Montour	150	845	2.6
Iowa Falls	215	1,007	2.5

SKUNK RIVER.

A branch of Mississippi River in eastern Iowa. This stream shows, so far as the data at hand indicates, a very regular profile.

Locality.	Distanee from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	505	.....
Rome	38	550	1.2
Vowell	146	750	1.9
Ames	182	907	4.4
Southeast part of Hamilton County	203	1,056	7.1

MINNESOTA RIVER.

This river heads in Bigstone Lake, on the boundary between Minnesota and South Dakota. After a long course to the southeast it turns sharply northward and joins the Mississippi near Minneapolis. Its slope throughout is extremely gentle, ranging from one-tenth of a foot per mile to two and eight-tenths, and with an average slope for its entire length of 249 miles of only one and one-tenth feet per mile. Throughout its course the river flows in a bottom land of considerable breadth, entirely out of proportion to the size of the present stream, indicating that in former times a much larger river excavated its present valley. Its drainage basin is 16,000 square miles.

The profile is from levels by the Corps of Engineers, U. S. A.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	688	
Shakopee	26	689	
Carver	33	691	0.3
Jordan ferry	41	693	0.3
Belleplaine	52	697	0.4
Blakeley	60	701	0.5
Henderson	73	711	0.8
Lesueur	82	716	0.6
Ottawa	90	723	0.9
St. Peter	97	731	1.1
Mankato	115	753	1.2
South Bend	119	758	1.3
Fort Ridgely	131	791	2.8
Mouth of Redwood River	146	815	1.7
Mouth of Yellow Medicine River	173	859	1.6
Mouth of Chippewa River	197	923	2.7
Lac qui Parle	211	938	1.1
Mouth of Pomme de Terre Creek	227	946	0.5
Bigstone Lake	249	976	1.4

RED RIVER.

Red River, of Minnesota, heads in Lake Traverse, and forms the boundary line between Minnesota on the east and the Dakotas on the west as far as the international boundary. Its course from its head to its mouth in Lake Winnipeg is very nearly north.

The profile is from levels by the Corps of Engineers, U. S. A.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, Lake Winnipeg	0	710	
Boundary line	120	753	0.4
Pelican	168	762	0.2
Turtle River	238	783	0.3
Grand Forks	263	789	0.2
Frog Point	298	811	0.6
Goose Rapids	320	823	0.5
Moorhead	418	874	0.5
Fort Abercrombie	489	912	0.5
Breckenridge	515	948	1.4
Fergus Falls	548	1,156	6.3

COLORADO RIVER.

Colorado River drains a peculiar region. While most of its water comes from high mountain ranges, the greater part of its course, as well as the courses of its tributaries, lies in the plateau region, an area of horizontal or slightly inclined plateaus, bordered by cliffs, in which the streams flow in steep-walled canyons; an area sparsely covered with soil and containing little vegetation. It is a region of slight rainfall, and the streams lose rather than gain in volume of water in traversing it. Colorado River heads in two main branches—Green and Grand rivers. The sources of Green River are in the Wind River Mountains of western Wyoming. At the foot of this range the river traverses for a hundred miles a broad, desert plain, known as Green River Basin. At the foot of this plain it meets Uinta Range. Through this range it has cut its way in a series of heavy gorges, emerging from them at the south base of the mountains and entering Uinta Valley, in which it flows for a short distance; then flowing southward it enters a series of uplifts, consisting of slightly inclined plateaus, three in number, dipping to the north. In each of these it burrows its way, the depth of the canyon increasing mile by mile, both by the increasing height of the plateau and the descent of the river. At the cliff which limits each of these plateaus on the south the river comes out to daylight for a short distance. At the foot of the most southern of these plateaus is Gunnison Valley, in which the Rio Grande Western Railroad crosses the river. In the canyon which succeeds this valley, caused by an uplift of the plateau, the Green is joined by the Grand, and the Colorado begins. Then follows a succession of uplifts, through which the river has been forced to cut its way, producing a continuous canyon, whose walls rise higher and higher with each succeeding uplift until the Grand Canyon is reached, whose walls are 6,000 feet in height and magnificent in their complexity. Farther west the land descends by a series of steps, produced by faults and folds, which finally bring the river to daylight at the mouth of the Grand Wash.

Grand River, which heads in the mountains in the eastern side of Middle Park, Colorado, encounters throughout its course a succession of obstacles similar to those met and overcome by Green River.

The branches of Grand River, Eagle River, Roaring Fork, Gunnison and Dolores rivers all head and have much of their courses in regions of high mountains, and naturally their slopes are both steep and irregular.

The entire area drained by Colorado River and its branches is 225,049 square miles.

The profile was prepared by Maj. J. W. Powell.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
Mouth of Gila River	150	125	0.8
Mouth of Williams River	340	375	1.3
Needles	385	448	1.6
Mouth of Virgin River	555	935	2.9
Mouth of Grand Wash (fault)	600	1,000	1.4
Mouth of Diamond Creek	650	1,312	6.2
Toroweap Valley (fault)	700	1,625	6.3
Mouth of Kanab Creek	730	1,810	6.2
	790	2,300	8.2
	800	2,520	22.0
Mouth of Little Colorado River	815	2,625	7.0
Mouth of Paria River (fault—Echo Cliffs)	880	3,187	8.6
Mouth of Navajo Creek	905	3,220	1.3
Crossing of the Fathers	920	3,250	2.0
Mouth of San Juan River	957	3,310	1.6
Mouth of Escalante River	970	3,325	1.2
Mouth of Dirty Devil River	1,030	3,434	1.8
	1,067	3,750	31.2
Mouth of Grand River	1,080	3,775	1.9
Green River crossing (Book Cliffs)	1,200	4,075	2.5
Mouth of Price River	1,220	4,200	6.25
	1,305	4,575	4.4
Mouth of White River	1,390	4,625	0.6
	1,435	4,750	2.8
Mouth of Yampa River	1,470	5,100	10.0
Brown park	1,490	5,375	13.8
Mouth of Henry fork	1,560	5,813	6.3
Mouth of Black fork	1,590	5,940	4.2
Green River city	1,620	6,075	4.5
Mouth of Big Sandy River	1,652	6,240	5.2
Mouth of Slate Creek	1,672	6,500	13.0
Mouth of Fontenelle Creek	1,684	6,620	10.0
Mouth of New Fork	1,728	6,900	6.3
Mouth of Horse Creek	1,754	7,180	10.8
Mouth of Lead Creek	1,769	7,383	13.5
	1,789	7,622	11.95
Bend, near head	1,800	7,808	16.9

LITTLE COLORADO RIVER.

This stream heads in the southern edge of the Mogollon Plateau, in eastern Arizona, and flows nearly northwest to its junction with the Colorado. Near the head its slope is steep, but through most of its course across the plateau, on the surface of which it flows, its slope is gentle. Toward its mouth it begins to burrow into the plateau, and its slope increases, finally, just before reaching the Colorado, becoming very steep, producing a curve near its mouth convex upward.

The profile is derived from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	2,625	
	6	2,750	20.8
	16	3,000	25.0
	24	3,250	31.3
	32	3,500	31.3
	40	3,750	31.3
	50	4,000	25.0
	66	4,250	15.6
	84	4,500	13.9
	126	4,750	5.9
	158	5,000	7.8
	188	5,200	6.7
	204	5,400	1.3
Near St. Johns	221	5,600	11.8
	235	5,800	14.3
	244	6,000	22.2
	250	6,200	33.3
	252	6,400	100.0
	254	6,600	100.0
	256	6,800	100.0
	262	7,000	33.3
Head	277	8,000	66.7

SAN JUAN RIVER.

This branch of Colorado River heads in many streams flowing south from the San Juan Mountains—Mancos, La Plata, Los Piños, and Animas rivers. At their south base it collects the waters of these several branches and thenceforward flows westward through a plateau region to its junction with the Colorado. In the mountains these streams

have steep descents, which are suddenly checked on reaching the plateau. In its course down the plateau, however, the slope of San Juan River is by no means gentle or regular. A feature of the slope of this river is the increase in its grade toward its mouth, showing that the parent stream, the Colorado, has thus far been able to cut its grade down more rapidly than the smaller stream.

The profiles of this river and its branches have been derived mainly from the reports of the Hayden survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	3,310	.....
	16	3,500	11.8
	58	3,750	5.9
	80	4,000	11.4
Bluff City	98	4,250	13.9
Four miles below mouth of Montezuma Creek	107	4,390	15.6
Mouth of McElmo Creek	118	4,510	10.9
	130	4,540	2.5
Mouth of Mancos River	143	4,700	12.3
	164	4,880	8.6
Pictured Rocks	186	5,180	13.6
Mouth of La Plata River	197	5,297	10.6
Mouth of Animas River	200	5,310	4.3
Mouth of Los Pinos River	240	5,750	11.0
Mouth of Piedra River	265	6,000	10.0
Pagosa Springs	303	7,095	28.8

RIO MANCOS, COLORADO.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	4,700	.....
	12	4,900	16.7
	22	5,270	37.0
	32	5,730	46.0
	38	6,250	86.7
Merritt ranch	52	7,360	79.3
	62	9,770	241.0

LA PLATA RIVER, COLORADO.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	5,297	
	10	5,500	30.3
	22	6,270	64.2
	38	7,922	103.3
Parrott City	43	8,500	115.6

ANIMAS RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	5,310	
Mouth of Florida River	38	6,106	20.9
Foot of Animas park	56	6,600	27.4
Head of Animas park	70	6,900	21.4
Mouth of Cascade Creek	80	7,700	80.0
Foot of Bakers park	97	9,400	100.0
Head of Bakers park	105	9,900	62.5
Divide at head	113	12,500	325.0

LOS PINOS RIVER, COLORADO.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	5,750	
Trail crosses	33	6,680	28.2
Big bend	42	7,288	67.6
Mouth of Vallecito Creek	48	7,688	66.7
Mouth of West Branch	60	8,688	83.3
Trail leaves stream	69	9,888	133.3
Weeminuche pass	75	10,670	130.3

GRAND RIVER, COLORADO.

[The profiles of this river and its branches are from the reports of the Hayden survey.]

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	3,775	
Mouth of Dolores River	52	4,250	9.1
Horseshoe bend	70	4,300	2.8
Head of low canyon	104	4,500	5.9
Mouth of Gunnison River	120	4,523	1.4
Mouth of Roan Creek	152	5,100	18.0
Mouth of North Mam Creek	188	5,645	15.1
Mouth of Roaring Fork	209	5,743	4.7
Mouth of Eagle River	228	6,125	20.1
Foot of canyon in Park Range	295	7,000	13.1
Mouth of Muddy Creek	302	7,180	25.7
Hot Springs	320	7,715	29.7
Forks	344	8,123	17.0
Grand Lake, Middle Park	348	8,153	7.5

RIO DOLORES, COLORADO.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	4,250	
Mouth of Unaweep Canyon	21	4,600	16.7
Mouth of San Miguel River	43	5,000	18.2
In Paradox Valley	49	5,100	16.7
Mouth of Disappointment Creek	83	6,500	41.2
Mouth of Lost Canyon	134	6,950	8.8

GUNNISON RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	4,523	
Mouth of Roubideau Creek	40	4,925	10.1
Mouth of Uncompahgre River	45	5,100	35.0
Mouth of North Fork	62	5,405	17.9
Mouth of Cebolla Creek	97	6,800	39.8
Mouth of Lake Fork	112	7,213	27.5
Mouth of White Earth River	123	7,450	21.5
Foot of open valley	130	7,638	26.9
Mouth of Tomichi Creek	141	7,725	7.9
Mouth of Slate River	157	8,176	28.2
Head of upper canyon	176	9,576	73.7
Mouth of Pass Creek	185	9,865	32.1
Head	200	11,000	75.7

UNCOMPAHGRE RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0.0	5,100	
Ford of Salt Lake road	29.5	5,800	23.7
Uncompahgre Agency	40.0	6,400	57.1
Mouth of Dallas Fork	54.5	7,000	41.4
Lower end of canyon	68.5	8,000	71.4
Lower end of small valley	72.5	9,500	375.0
Head of small valley	74.5	9,700	100.0
Divide at head	78.5	11,100	350.0

LAKE FORK OF GUNNISON.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0.0	7,213	
Mouth of Indian Creek	15.0	7,860	43.1
Mouth of Goodwin Creek	36.0	8,660	38.1
Mouth of South Branch	51.0	9,860	80.0
Valley	56.5	11,060	218.2
Head	59.0	13,260	880.0

ROARING FORK.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	5,743	
Mouth of Rock Creek	12	6,000	21.4
Mouth of Frying-pan Creek	25	6,626	48.2
Mouth of Castle Creek	43	7,942	73.1
Mouth of Difficult Creek	48	8,241	59.8
Mouth of Hunter Creek	55	9,400	165.6
Head	64	11,676	252.9

EAGLE RIVER, COLORADO.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	6,125	
Head of canyon	29	7,065	32.4
Mouth of Gore Creek	41	7,700	52.9
Mouth of Roche Moutonnée Creek	45	7,856	39.0
Mouth of Homestake Creek	50	8,693	167.4
Head in Tennessee pass	62	10,418	143.7

SEVIER RIVER.

Sevier River heads in the plateaus in southern Utah, and flows for a long distance northward through valleys separating plateaus and mountain ranges, with a steep but gradually diminishing slope. In central Utah it turns sharply, flowing west in a canyon through the Canyon Range, where its descent is somewhat steeper, and out into Sevier Desert, through which it flows with a very gentle slope to Sevier Lake, into which it sinks.

The profile is derived from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Sevier Lake, mouth	0	4,600	
Near Deseret	34	4,638	1.1
In canyon	88	4,750	2.1
Above Salina	152	5,000	3.9
Joseph	180	5,250	8.9
	189	5,500	27.8
	205	5,750	15.6
Circle Valley	223	6,000	13.9
	243	6,250	12.5
Near Panguitch	255	6,500	20.8
Near Hillsdale	265	6,750	25.0
	271	7,000	41.7
Head	279	7,500	62.5

BEAR RIVER.

Bear River heads in the northern slope of Uinta Mountains in northeastern Utah. The steep slope of the mountain side is succeeded by a comparatively gentle slope as it flows northward through a succession of broad valleys. At Soda Springs it turns sharply upon itself and flows nearly south, and immediately descends from the surface of a basalt flow to its base, producing a succession of falls and rapids. Through Cache Valley its slope is very gentle, but at The Gates, where it emerges from Cache Valley into the valley of Great Salt Lake, it has a steep descent in a series of rapids.

The profile is from the measurements of the Hayden survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	4,218	
Hampton Bridge	24	4,353	5.6
Head of Gates	30	4,450	16.2
Mouth of Battle Creek	66	4,499	1.4
Foot of canyon below Gentile Valley	73	4,609	15.7
Head of canyon below Gentile Valley	88	4,692	5.5
Bend below Sheep Rock	113	5,737	41.8
Soda Springs	125	5,855	9.8
	151	5,900	1.7
Foot of canyon above Bear Lake Valley	171	5,989	4.5
Mouth of Smith Fork	201	6,223	7.8
	216	6,254	2.1
	243	6,353	3.7
Bend	251	6,505	19.0
Evanston	270	6,800	15.5
Head	320	11,000	84.0

HUMBOLDT RIVER.

This river of Nevada heads in the northeastern part of the State and flows southwestward, sinking in Humboldt Lake, in the western part of the State. In its course of more than 300 miles it flows almost directly across the series of uplifts forming the Basin ranges, but in most cases it passes through broad gaps in these ranges rather than in canyons. The drainage basin is 32,148 square miles.

The profile is from the Fortieth Parallel Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Humboldt Lake, sink	0	3,900	
Lovelock	8	3,950	6.3
Oreana	20	4,150	16.7
Humboldt	40	4,200	2.5
Raspberry	68	4,300	3.6
Winnemucca	90	4,325	1.1
Golconda	108	4,350	1.4
Stonehouse	133	4,400	2.0
Battle Mountain	153	4,500	5.0
Shoshone	178	4,600	4.0

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Palisade	203	4,800	8.0
Moleen	223	4,975	8.8
Osino	244	5,100	5.9
Halleck	258	5,200	7.1
Deeth	272	5,300	7.1
Humboldt Wells	292	5,600	15.0
Independence, head	308	6,000	25.0

SACRAMENTO RIVER.

Sacramento River heads in the mountains of northern California, principally in the easternmost of the coast ranges. Its head streams, upon reaching the great depression between the Sierra Nevada and the Coast Ranges, turns south and by a steep descent in a deep canyon it flows off a volcanic plateau which surrounds Mount Shasta. Having reached the level of the great California Valley, its slope rapidly diminishes, and below Red Bluff becomes very slight. Indeed, from Sacramento to the bay the descent is trifling, the river meandering most of the way through great tule marshes.

This river has been in times past overloaded with detritus from placer mines, which have caused it to deposit freely, building up its course above the adjacent country. Much of the city of Sacramento lies at present below the level of the river when in flood and is protected from it by levees.

The profile is from the levels of the Engineer Corps, U. S. A.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
New York landing	0	0	.....
Collinsville	3	0	.....
Rio Vista	17	1	.....
Head of Grand Island	37	5	0.1
Heacock shoals	54	7	0.1
Sacramento	64	9	0.2
Mouth of Feather River	84	16	0.35
Knight landing	99	20	0.3
Winn landing	120	27	0.3
Colusa	155	43	0.5
Caldins	167	57	1.2
John Boggs landing	171	62	1.3

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Princeton	175	67	1.3
Butte	180	73	1.2
Jacinto	192	93	1.7
Parrott landing	195	98	1.66
Monroeville	203	110	1.5
Chico landing	209	119	1.5
Bidwell landing	214	128	1.8
Gazelle chute	230	157	1.8
Squaw Hill	236	168	1.8
Tehama	247	201	3.0
Sacramento bar	255	225	3.0
Last Chance	261	237	2.0
Red Bluff	265	245	2.0
	306	400	3.8
Near Buckeye	326	600	10.0
	344	800	11.1
Delta	356	1,000	16.7
	364	1,200	25.0
Southern	368	1,600	100.0
Upper Soda Spring	379	2,000	36.4
	384	3,000	200.0
Head	399	7,000	266.7

PIT RIVER.

[From the atlas sheets of the United States Geological Survey.]

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	687	.....
	13	1,000	24.1
	17	1,200	50.0
	31	1,400	14.3
	40	1,600	22.2
	47	1,800	28.6
	51	2,000	50.0
Near Fall River mills	75	3,000	41.7
Above Pittville	86	3,400	36.4
Foot of Big Valley	107	4,000	28.6
	127	4,200	10.0
Canby	152	4,350	6.0
Alturas Hill	176	4,446	4.0
Goose Lake	196	4,800	17.7

OTHER CALIFORNIA RIVERS.

The Sierra streams, Feather, American, Yuba, Mokelumne, Calaveras, Stanislaus, Tuolumne, and Cosumnes rivers, are all characterized by extremely steep and irregular slopes.

Pit River is one of the largest branches of the Sacramento. It heads in Goose Lake, in northeastern California. For some distance below the lake it has a comparatively gentle course. It cuts its way through the Sierra Nevada in a deep gorge, in the upper part of which the slope is gentle, but after passing the divide of the range its course becomes extremely steep, and this slope is maintained with but little diminution to its mouth.

FEATHER RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	.....
Nicolaus	10	9	0.9
Yuba River	20	21	1.2
Burt ferry	44	56	1.5
Oroville	57	100	3.4
Middle Fork	64	198	14.0
West Branch	73	648	50.0
Upper end Big Bend	85	1,080	36.0
Buck Creek	104	1,954	46.0
Chip Creek	112	2,370	52.0
East Branch	115	2,559	63.0
Carriboo	121	2,949	65.0
Bidwell bridge	136	4,678	115.3

YUBA RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, Marysville	0	60	.....
Long bar	15	100	2.6
Forks, North and South	28	500	30.8
Forks of North Fork	36	1,000	62.5
Up North Fork, Slate Range bar	53	2,000	58.8
Downieville	70	3,000	58.8
Loganville	78	4,000	125.0
Tehuantepec Valley	90	6,700	225.0

AMERICAN RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth at Sacramento	0	10	.....
	23	100	3.9
Forks	28	200	20.0
Up North Fork	37	300	11.1
	41	400	25.0
	44	500	33.3
Mouth Middle Fork	48	600	25.0
	56	700	12.5
	59	800	33.3
Toll House	66	1,000	28.6
	77	1,500	45.5
Mouth of North Fork	83	2,000	83.3
	94	3,000	90.9
	100	4,000	166.7
	105	5,000	200.0
	112	6,000	142.8
	118	8,500	416.7

COSUMNES RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth, Benson bridge	0	25	.....
	25	100	3.0
	34	200	11.1
	44	500	30.0
Forks, North and South	47	800	100.0
Up North Fork	54	1,000	28.6
Sweeney	66	2,000	83.3
Dyer mill	72	3,000	166.7
	78	4,000	166.7
	83	5,000	200.0
	89	6,000	166.7
Head	93	7,500	375.0

MOKELUMNE RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Junction with Cosumnes River	0	25	
	28	100	2.7
	39	200	9.1
	47	500	37.5
	58	1,000	45.5
	66	2,000	125.0
	78	3,000	83.3
	90	4,000	83.3
	98	5,000	125.0
	103	6,000	200.0
Hermit Valley	109	7,000	166.7
Head	116	8,000	142.9

CALAVERAS RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	5	
Bellota	23	100	4.1
	44	200	4.8
	51	500	42.9
	68	1,000	29.4

STANISLAUS RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	30	
Oakdale	26	200	6.5
Parrott ferry	65	1,000	20.5
Forks	75	1,300	30.0
	79	2,000	175.0
	83	3,000	250.0
	89	4,000	166.7
	97	5,000	125.0
	102	6,000	200.0
	113	8,000	181.8

TUOLUMNE RIVER.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	40	
Lagrange	50	300	5.2
	59	500	22.2
	74	1,000	33.3
Forks	79	1,200	40.0
	87	1,600	50.0
	98	2,000	36.4
Canyon	109	3,000	90.9
	125	4,000	62.5
	133	5,000	125.0
	137	6,000	250.0
	138	7,000	1,000.0
Head of canyon	141	8,000	333.0
Meadows	144	8,500	167.0
	154	9,000	50.0
	155	10,000	1,000.0

KLAMATH RIVER.

Klamath River heads in Klamath Lake, in southern Oregon, and flows westward through the Coast Mountains by a somewhat sinuous course to the Pacific. It has a rapid and an extremely irregular fall, showing that its existence under the present topographic conditions has been brief. Its drainage basin is 14,660 square miles.

The profile is from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	
	127	1,800	14.2
	146	2,000	10.5
	158	2,200	16.7
	159	2,400	200.0
	161	2,600	100.0
	177	2,800	12.5
	185	3,800	125.0
	194	4,000	22.2
Linkville, outlet Klamath Lake	214	4,186	9.3

COLUMBIA RIVER.

Columbia River, including Clark Fork, heads in the Rocky Mountains, west of Helena, Montana. Its slope is great from its head to the crossing of the Northern Pacific Railroad, below the mouth of Flathead River. In northern Idaho it flows through Lake Pend Oreille, and below that, in its northward course to the international boundary, it has a steeper descent. In this part of its course it is in a deep canyon. Thenceforward for several hundred miles it has a gentle slope, interrupted by rapids of no great magnitude until Kettle falls are reached. Other rapids succeed, the most formidable being Rock Island rapids, which form a complete obstruction to navigation. In its lower course in passing the Cascade Range it encounters two notable rapids, the Cascades and the Dalles, both of which interrupt navigation.

The entire drainage area of Columbia River is 216,537 square miles, about half of which belongs to Columbia River proper, and half to its main branch, Snake River.

The profile of the Columbia is in part from the work of Lieutenant Symons, in part from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	.....
Mouth of Snake River	312	145	0.5
	331	400	13.4
Rock Island rapids	466	594	1.4
Wenatchee	473	618	3.4
Orondo	494	665	2.2
Troy	504	680	1.5
Chelan falls	515	700	1.8
Mouth of Methow River	536	750	2.4
Virginia City	542	760	1.7
Mouth of Okanogan River	546	770	2.5
Mouth of Spokane River	655	1,073	2.8
Below Grand rapids	692	1,167	2.5
Below Kettle falls	699	1,191	3.4
Above Kettle falls	699	1,224	.....
North boundary	740	1,305	2.0
Pend Oreille Lake, foot	854	2,062	6.6
Pend Oreille Lake, head	881	2,062	.....
Crossing N. P. R. R	930	2,298	4.8
Missoula	1,072	3,191	17.8
Near Bonita	1,097	3,621	17.2

WILLAMETTE RIVER.

This river, one of the main southern branches of the Columbia in Oregon, heads in the Cascade Range. Flowing down its slopes to the center of the Willamette Valley, it turns northward and pursues this course to its junction with the Columbia, just below the city of Portland. The profile represents only a portion of its course in the Willamette Valley. It shows a fairly uniform slope, gradually diminishing downward until the falls at Oregon City are reached, where there is an abrupt drop of 41 feet, with a second drop just below it, at Clackamas rapids, amounting to 5½ feet.

The drainage basin of the Willamette River is 11,700 square miles.

The profile is from the levels of the Engineer Corps, U. S. A.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	0	.....
Portland	12	0	.....
Foot of Clackamas rapids	23	0.5	.....
Head of Clackamas rapids	24	6	5.5
Oregon City, below falls	26	6	.....
Oregon City, above falls	26	47	.....
Rogers landing	49	50	0.1
Salem	84	107	1.6
Independence	95	129	2.0
Albany	119	165	1.5
Corvallis	131	184	1.6
Peoria	144	216	2.5
Harrisburg	164	286	3.5
Eugene	184	396	5.5

FLATHEAD RIVER.

Flathead River heads in Canada and flows southward, first with a steep and then with a gentle slope, into Flathead Lake. Below this lake it turns to the west and joins the Columbia.

Its profile is in part from the levels of the Northern Pacific Railway, in part from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	2,410	.....
Crossing N. P. R. R.	15	2,464	3.6
Flathead Lake, foot	81	2,874	6.2
Flathead Lake, head	101	2,874	.....
	151	3,000	2.5
	168	3,400	23.5
Near north boundary	186	3,800	22.2

SNAKE RIVER.

Snake River heads in Shoshone Lake in Yellowstone Park, thence it flows through Lewis Lake and, at the head of Jackson Hole, through Jackson Lake. Below the latter lake it has a steep descent, which is greatly increased in the canyon through which it passes from Jackson Hole to Snake River plains. Here it flows on the surface of a basalt field, and its course for some distance is extremely sluggish, through a broad extent of marshes. It soon, however, begins to cut into the basalt and to quicken its course to such an extent that it was in the early days called Mad River.

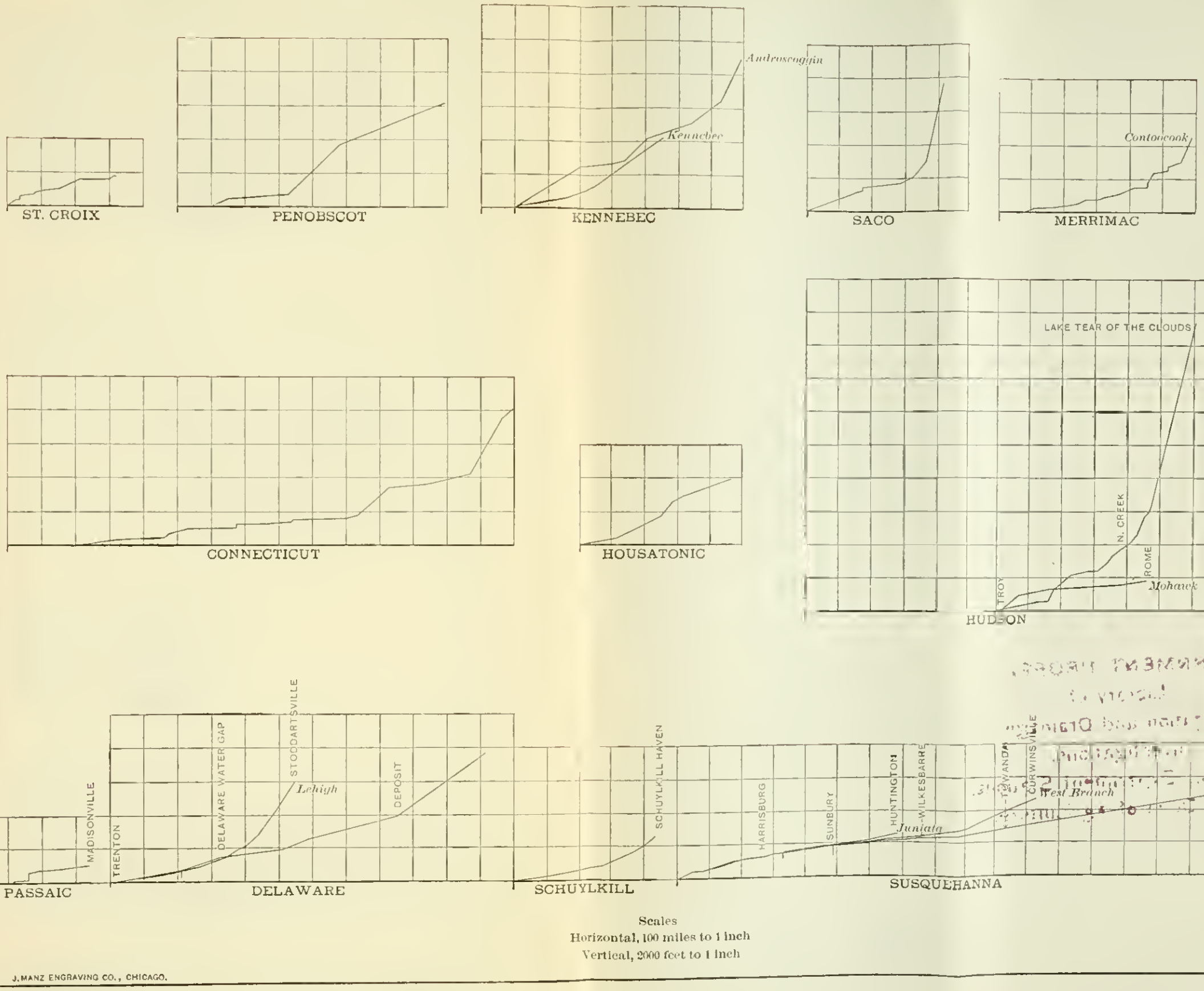
In descending from bench to bench in this basalt field, produced by successive flows of lava, it has falls, American falls near the mouth of Portneuf River, and Shoshone falls, lower down. Below Shoshone falls its slope is quite gentle for a long distance, but increases greatly in the canyon by which it cuts through the Blue Mountains. Below this canyon the slope to its mouth is very gentle. It is navigable to Lewiston, Idaho.

It is a large stream, having a total length of 939 miles and a drainage area of 103,835 square miles, or nearly half that of Columbia River.

The profile is almost entirely from the atlas sheets of the United States Geological Survey.

Locality.	Distance from mouth.	Height above sea.	Fall per mile.
	Miles.	*Feet.*	*Feet.*
Mouth	0	145	
Weiser	306	2,123	6.5
Mouth of Malheur and Payette rivers	324	2,152	1.6
	363	2,200	1.2
	391	2,230	1.1
	417	2,300	2.7
	430	2,350	3.8
Glenns Ferry	480	2,500	3.0
	602	4,190	13.9
	620	4,205	0.8
Mouth of Rock Creek	644	4,242	1.5
Mouth of Portneuf River	669	4,335	3.7
Anderson	682	4,362	2.1
	750	5,030	9.8
Mouth of Salt River	807	5,363	5.8
In canyon	823	5,909	34.1
Mouth of Gros Ventre River	855	6,227	9.9
Mouth of Lake Creek	867	6,440	17.7
Foot of Jackson Lake	887	6,808	18.4
Lewis Lake	931	7,720	20.7
Shoshone Lake	939	7,746	2.5

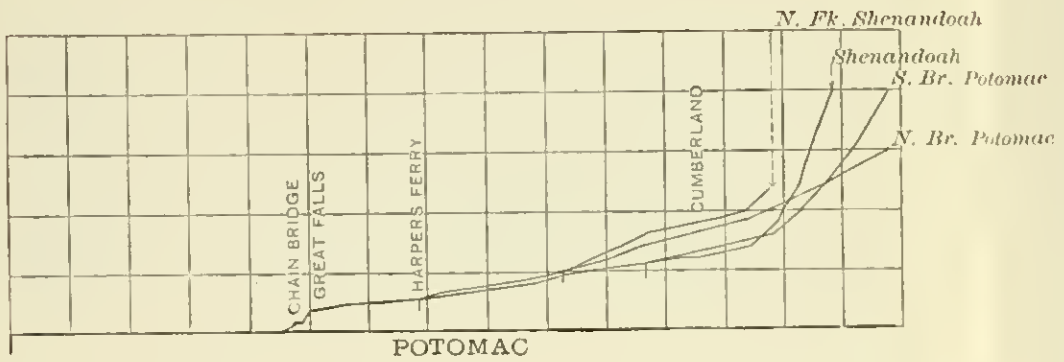
GOVERNMENT PROPERTY.
Library of
Irrigation and Drainage
Investigations.
Office of Experiment Stations.
U. S. Dept of Agriculture.



Scales
Horizontal, 100 miles to 1 inch
Vertical, 2000 feet to 1 inch

J. MANZ ENGRAVING CO., CHICAGO.

PROFILES OF RIVERS.



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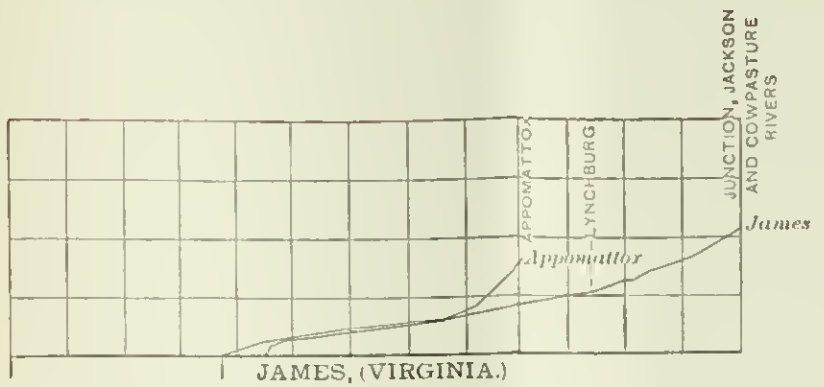

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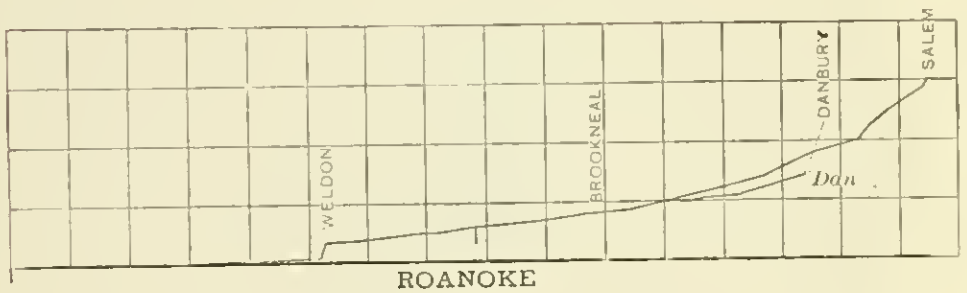

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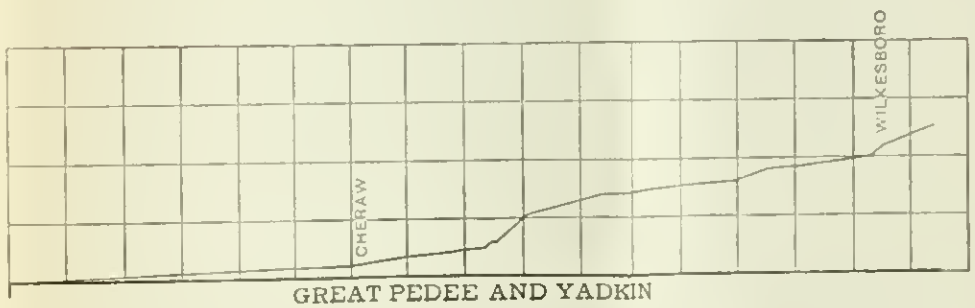

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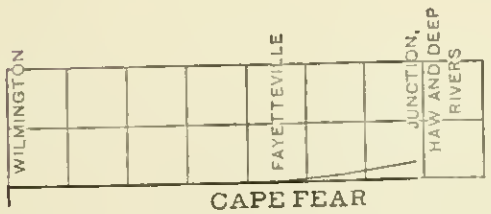

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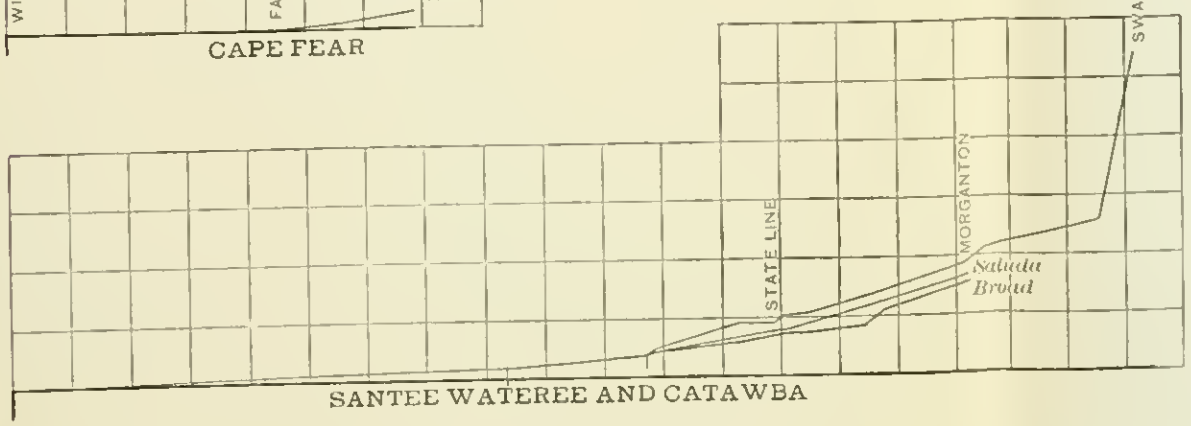

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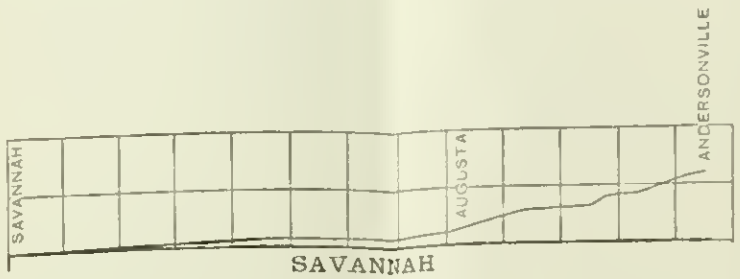
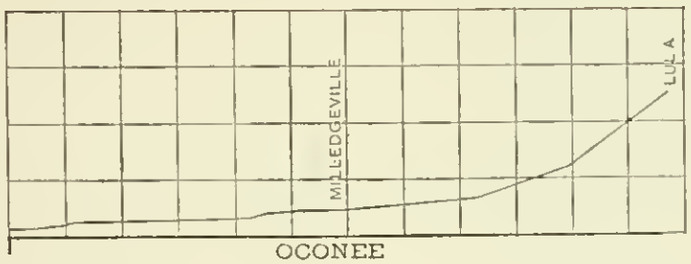


SAVANNAH

Scales
Horizontal, 100 miles to 1 inch
Vertical, 2000 feet to 1 inch

J. MANZ ENGRAVING CO., CHICAGO.

PROFILES OF RIVERS.



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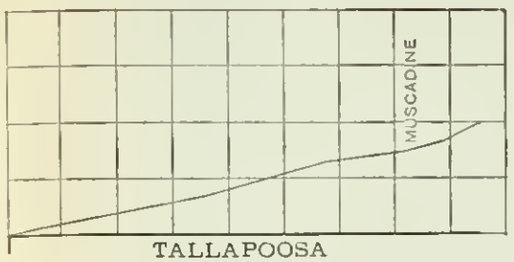

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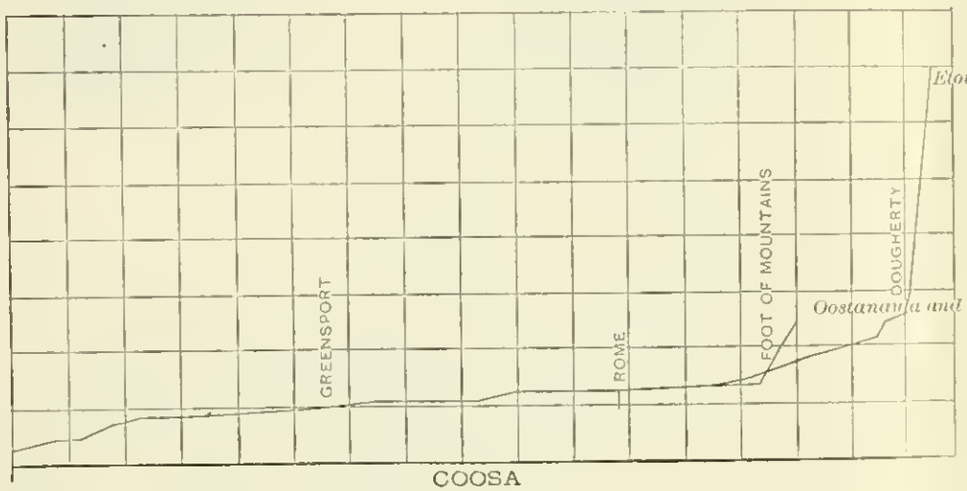
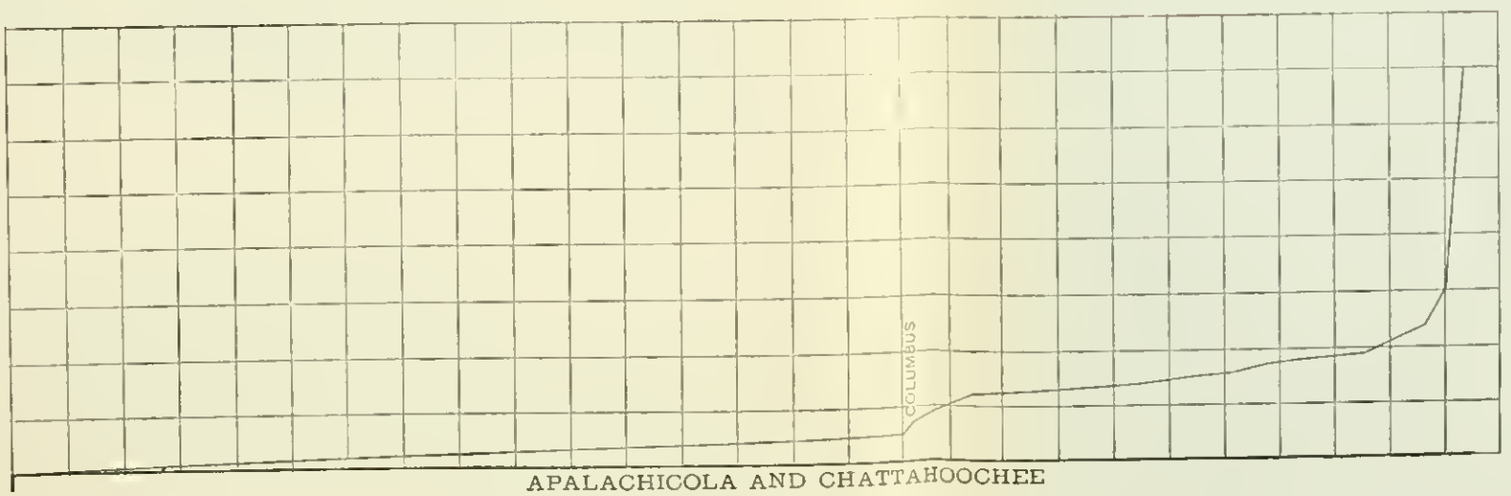


COOSA

BLACK WARRIOR

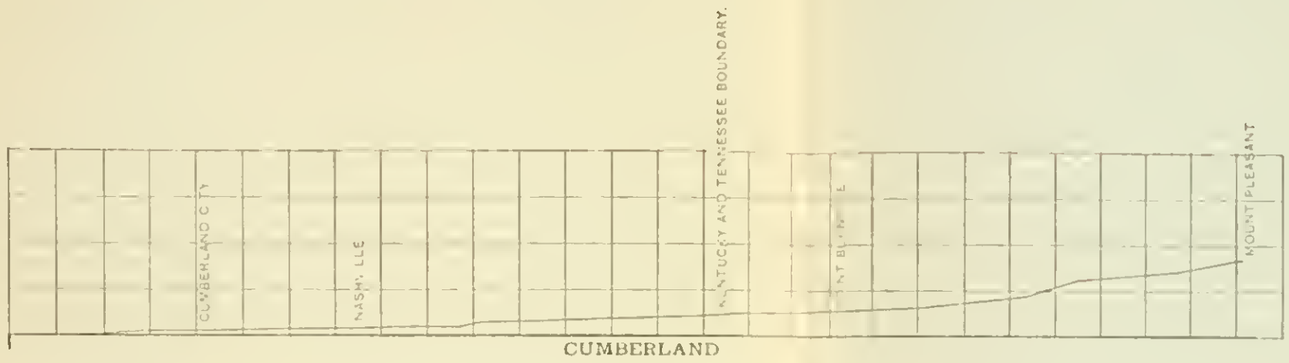


APALACHICOLA AND CHATTAHOOCHEE

Scales
Horizontal, 100 miles to 1 inch
Vertical, 2000 feet to 1 inch

J. MANZ ENGRAVING CO., CHICAGO.

PROFILES OF RIVERS.



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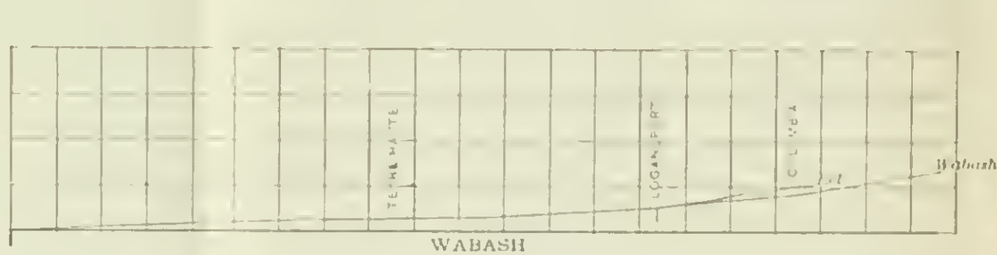

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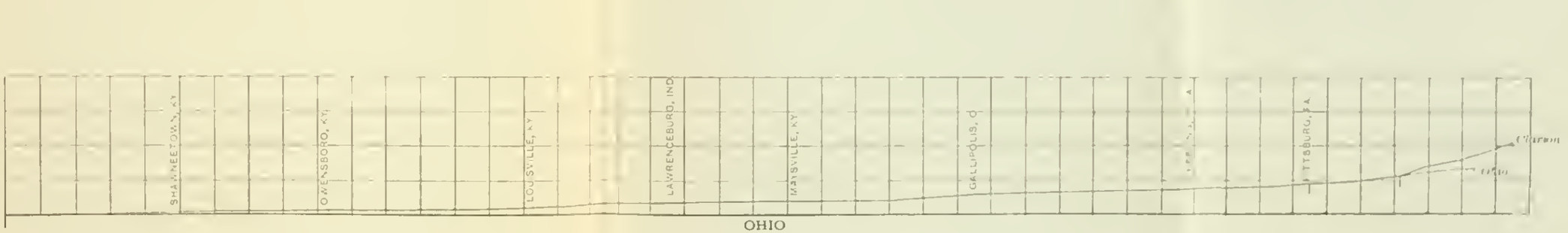

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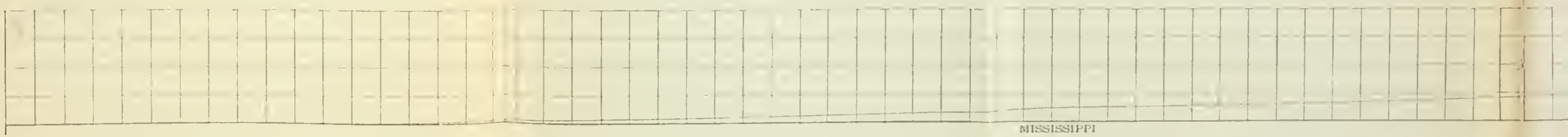
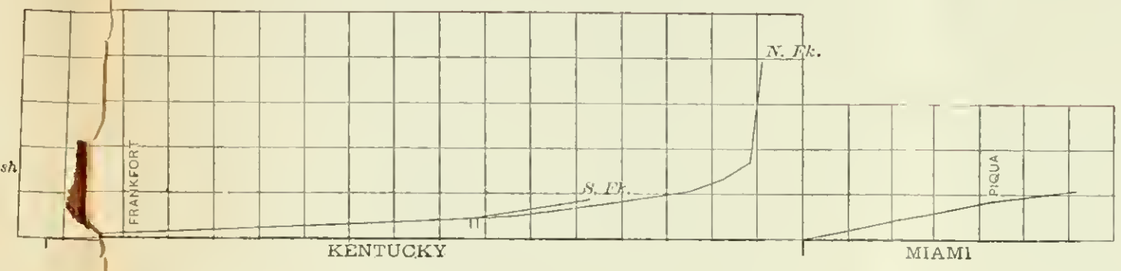


MISSISSIPPI

Scales
Horizontal, 100 miles to 1 inch
Vertical, 2000 feet to 1 inch

J. MANZ ENGRAVING CO., CHICAGO.



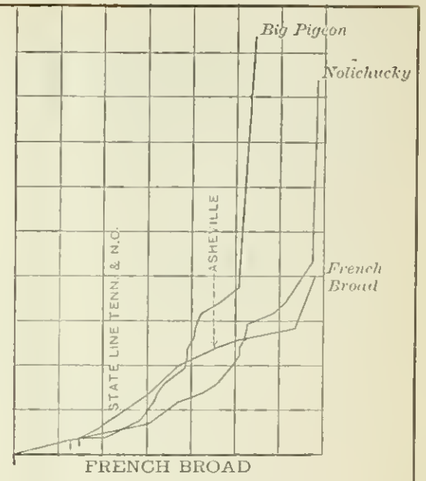
KENTUCKY

MIAMI

BIG SANDY

GUYANDOT

MUSKINGUM



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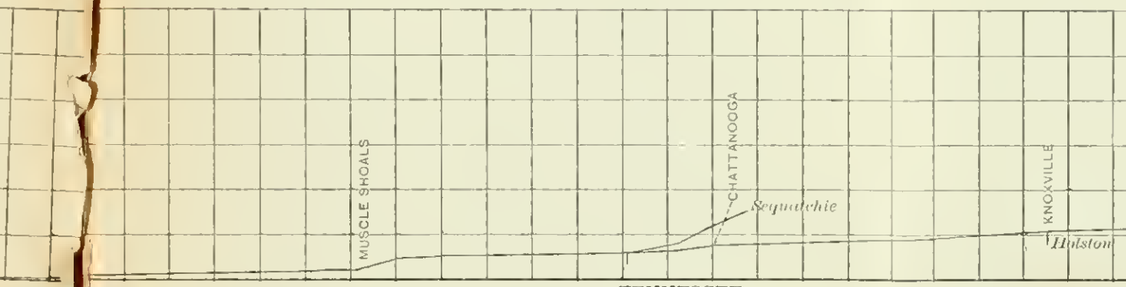
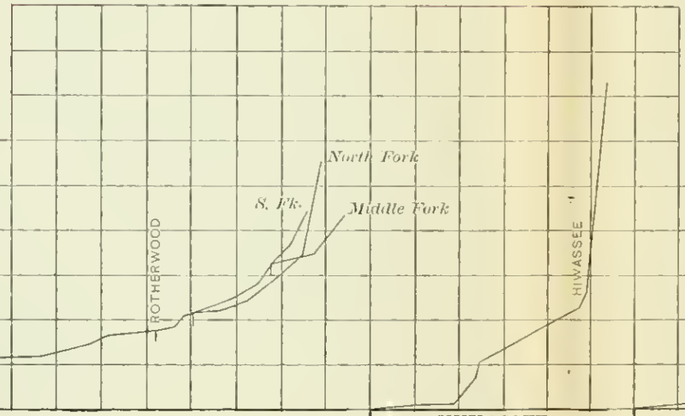
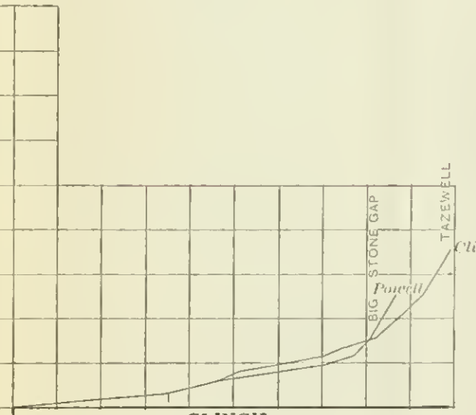




TENNESSEE

HIWASSEE



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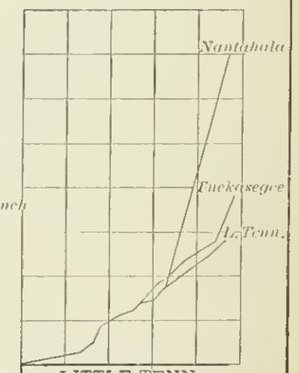
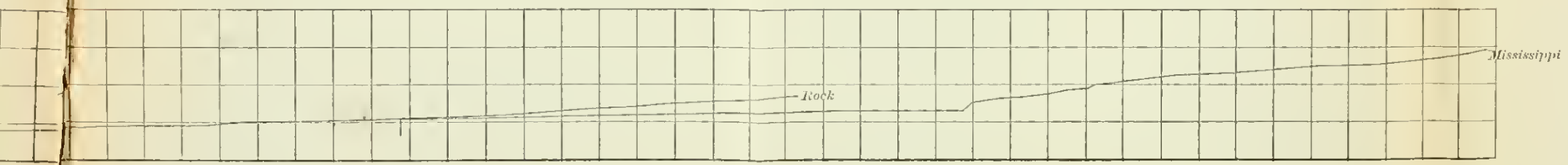


LITTLE TENN.



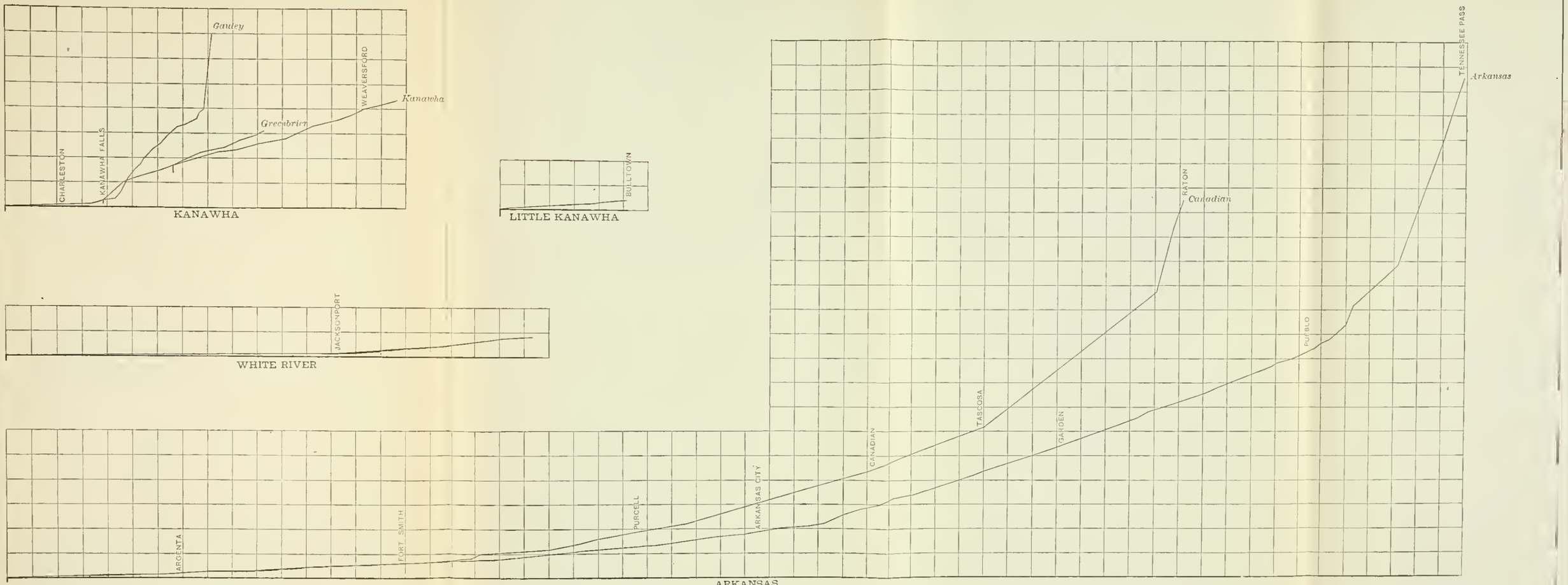
ILLINOIS

PROFILES OF RIVERS.

KANAWHA

LITTLE KANAWHA

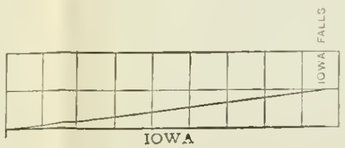
WHITE RIVER



ARKANSAS

Scales
Horizontal, 100 miles to 1 inch
Vertical, 2000 feet to 1 inch

SKUNK



IOWA

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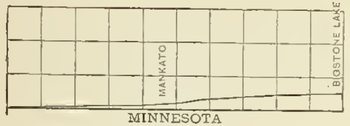
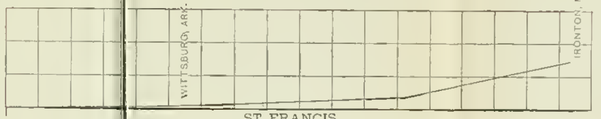
PROFILES OF RIVERS.

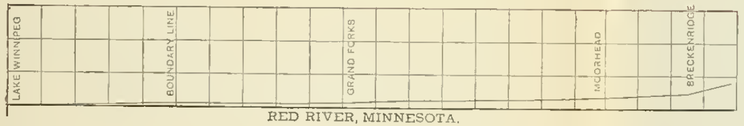


MINNESOTA



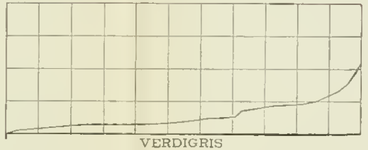
ST. FRANCIS

MERAMEC



RED RIVER, MINNESOTA.

NEOSHO



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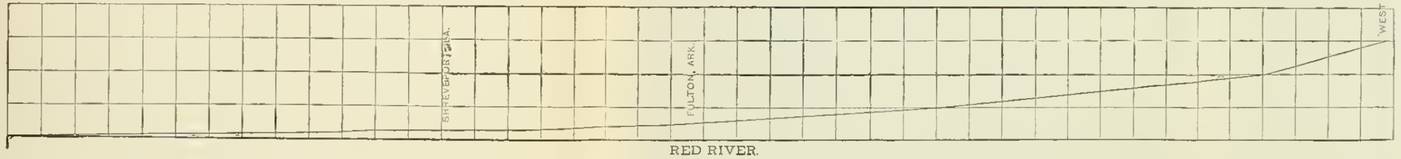
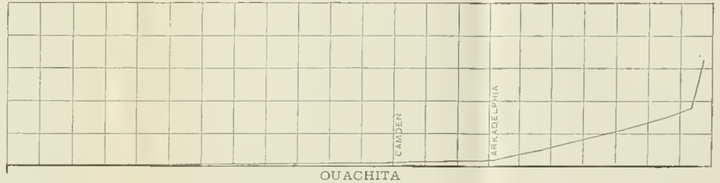


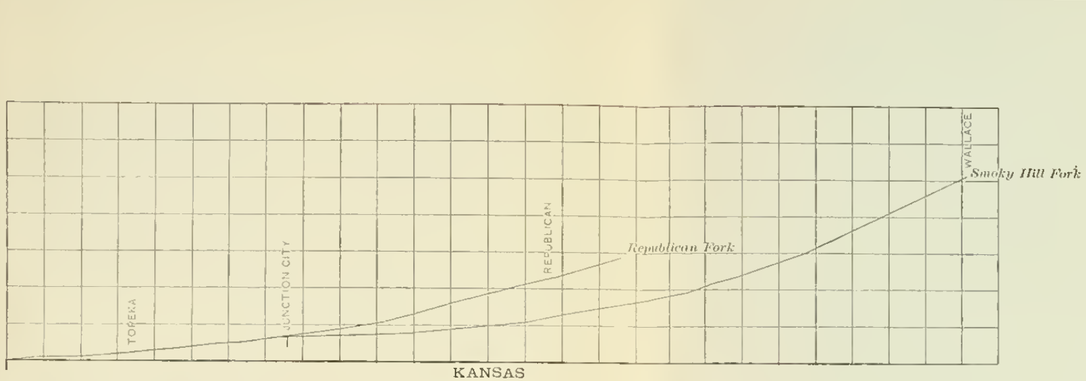
RED RIVER.



OUACHITA

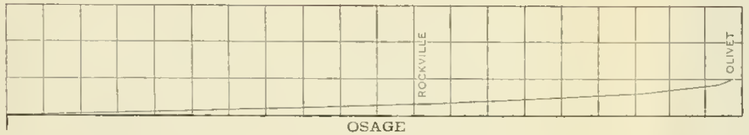
Scales
Horizontal, 100 miles to 1 inch
Vertical, 2000 feet to 1 inch

PROFILES OF RIVERS.

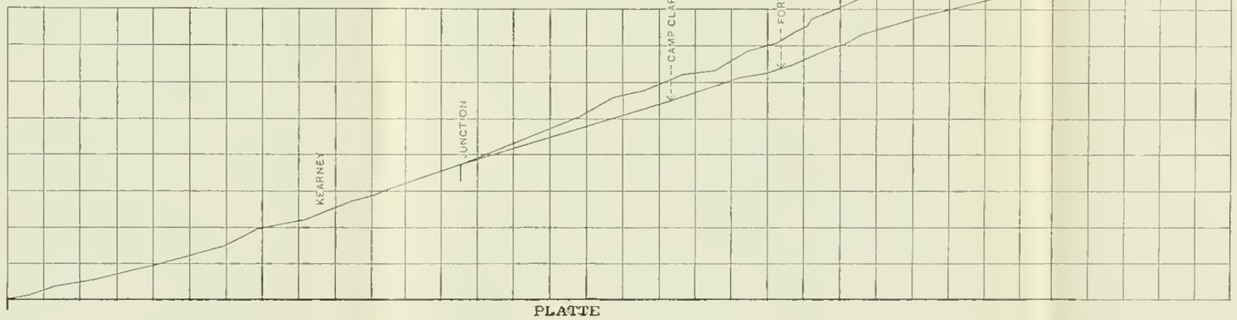


KANSAS

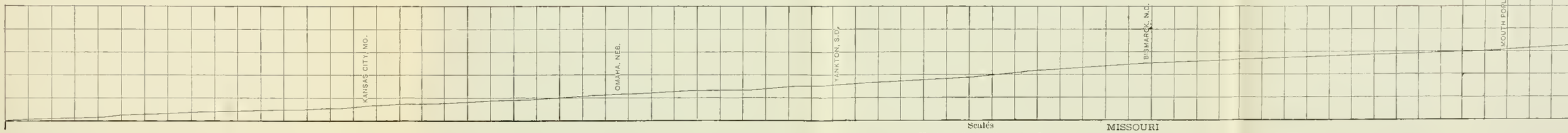
MILK



OSAGE



PLATTE

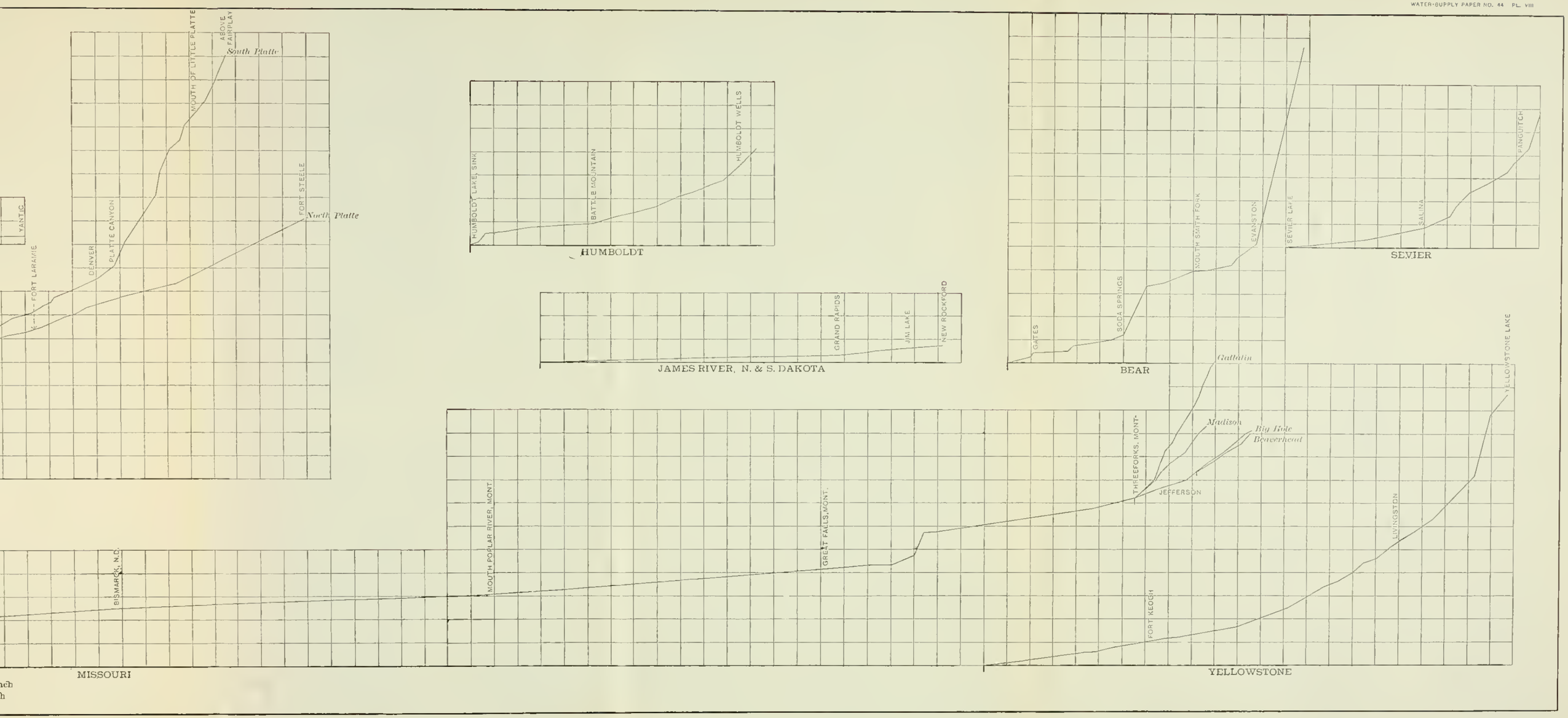


MISSOURI

Scales
Horizontal, 100 miles to 1 inch
Vertical, 2000 feet to 1 inch

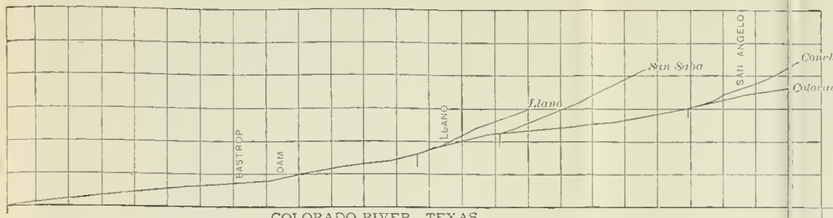
J. MANZ ENGRAVING CO., CHICAGO.

PROFILES OF RIVERS.



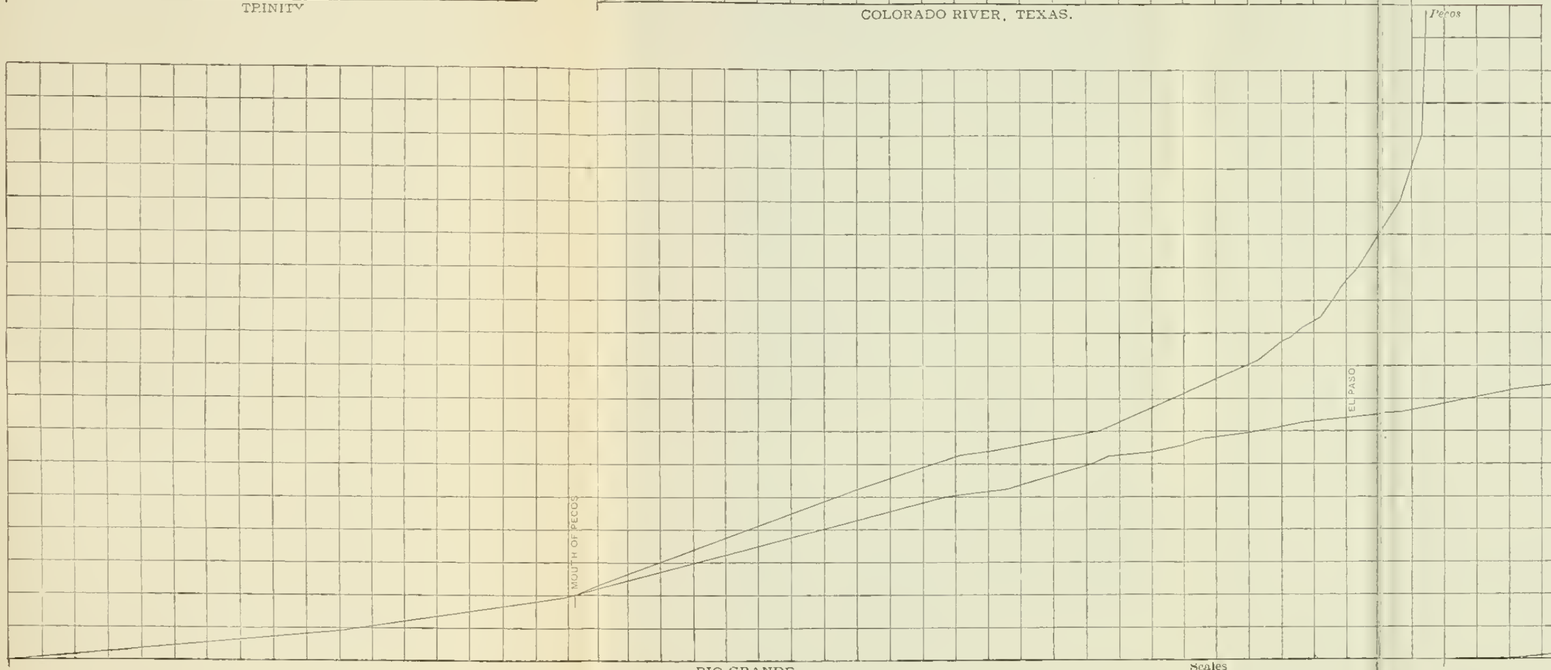
PROFILES OF RIVERS.

TRINITY



COLORADO RIVER, TEXAS.

NUECES



RIO GRANDE

BRAZOS AND CLEAR FORK

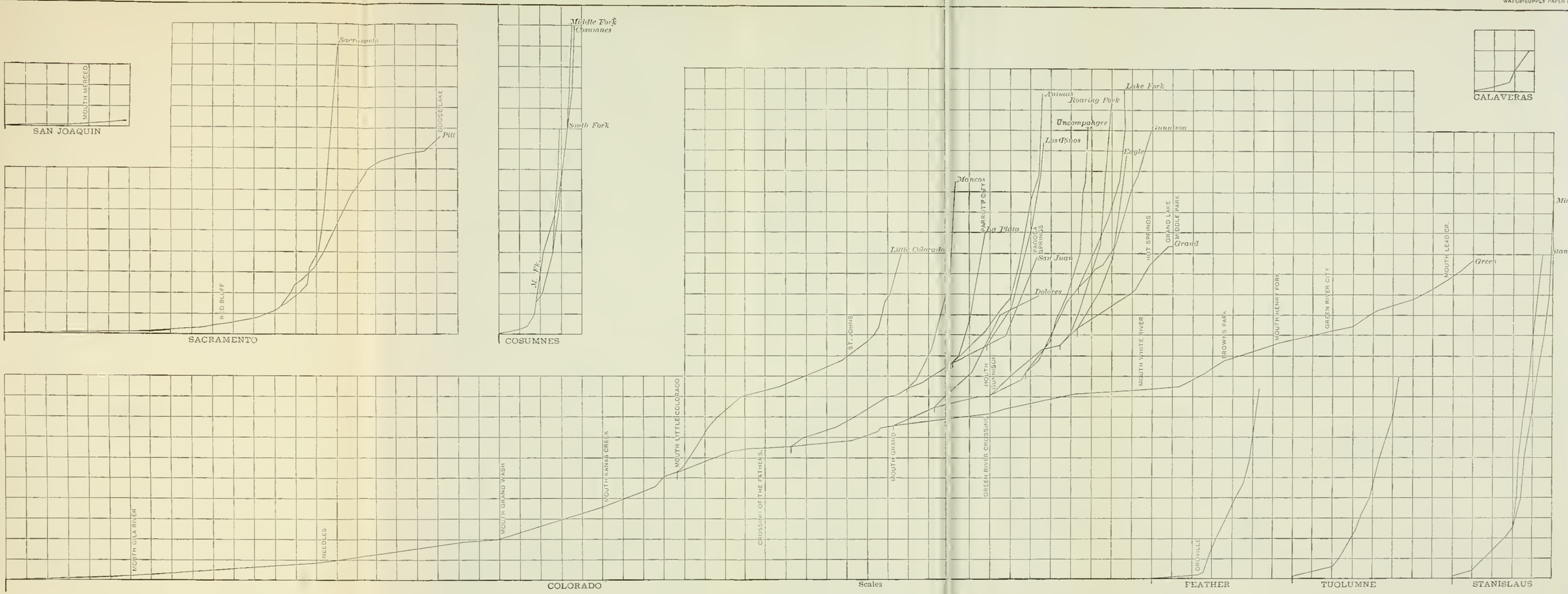
Scales

Horizontal, 100 miles to 1 inch

Vertical, 2000 feet to 1 inch

PROFILES OF RIVERS.

J. MANZ ENGRAVING CO., CHICAGO.



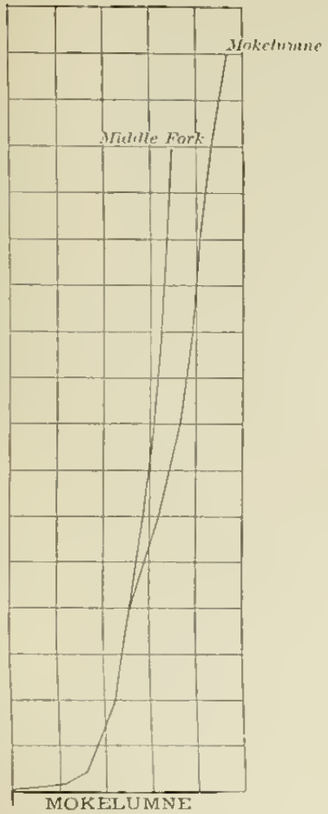
Scales

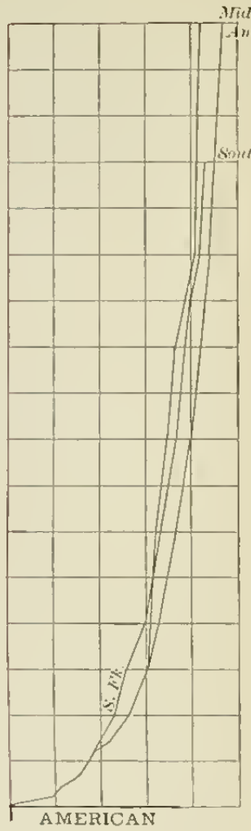
Horizontal, 100 miles to 1 inch

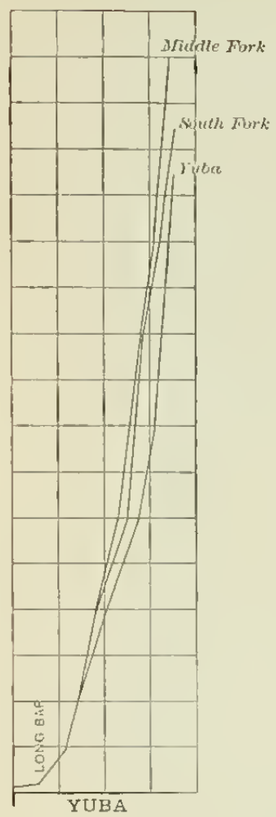
Vertical, 2000 feet to 1 inch

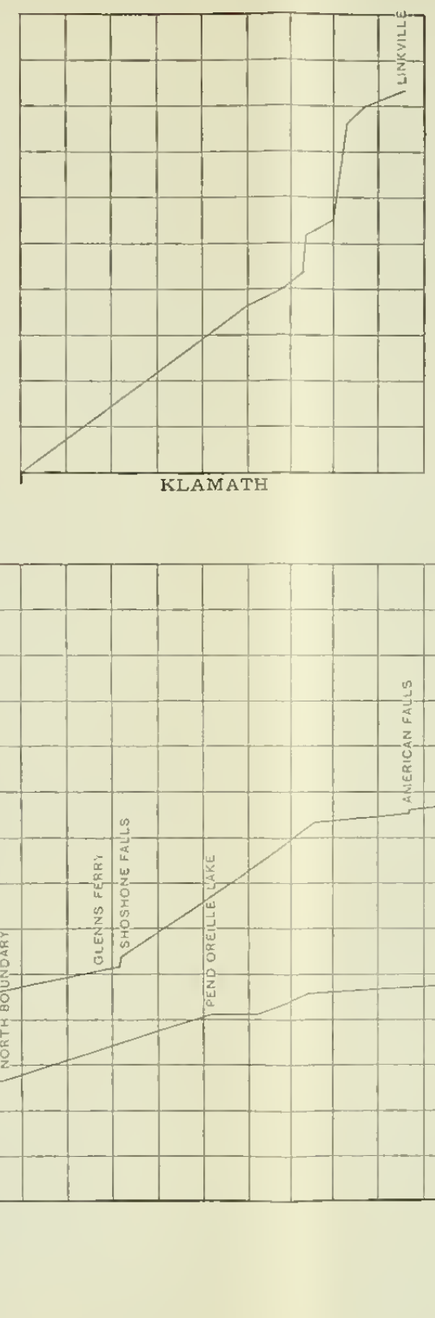
J. MANZ ENGRAVING CO., CHICAGO.

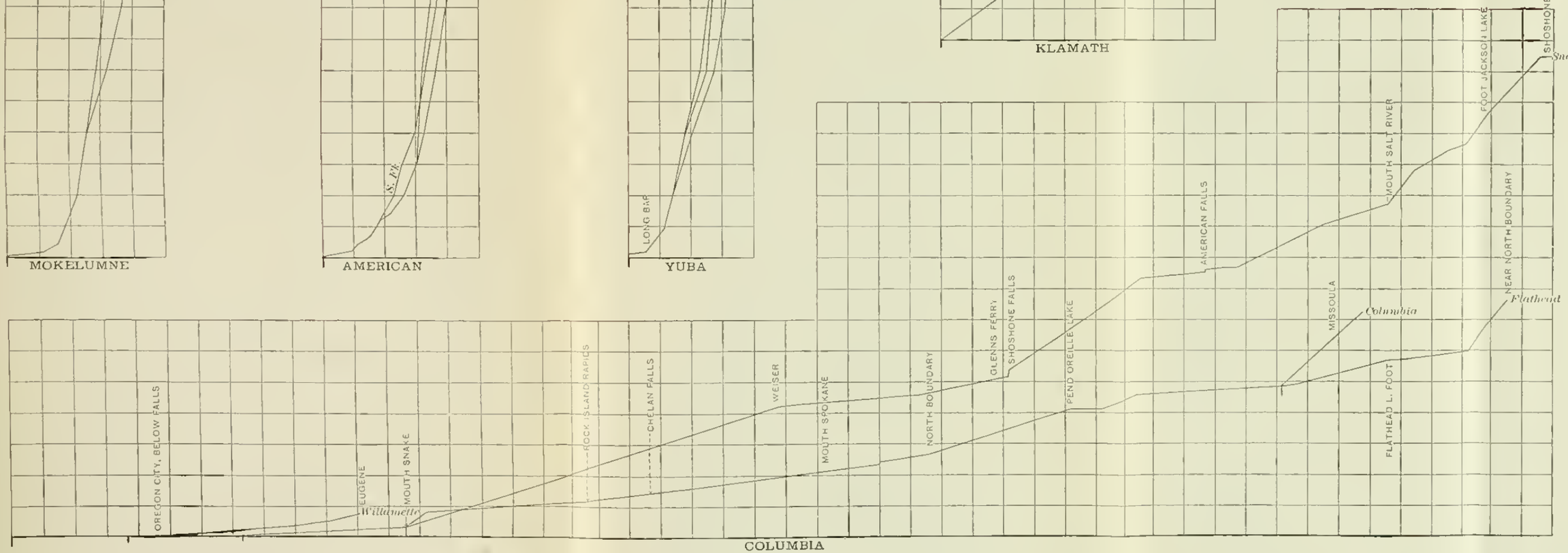
PROFILES OF RIVERS.











Scales
Horizontal, 100 miles to 1 inch
Vertical, 2000 feet to 1 inch

J. MANZ ENGRAVING CO., CHICAGO.

PROFILES OF RIVERS.

GOVERNMENT PROPERTY.
Library of
Irrigation and Drainage
Investigations,
Office of Experiment Stations,
U. S. Dept of Agriculture.

1895.

Sixteenth Annual Report of the United States Geological Survey, 1894–95, Part II, Papers of an economic character, 1895; octavo, 598 pp.

Contains a paper on the public lands and their water supply, by F. H. Newell, illustrated by a large map showing the relative extent and location of the vacant public lands also; a report on the water resources of a portion of the Great Plains, by Robert Hay.

A geological reconnoissance of northwestern Wyoming, by George H. Eldridge, 1894; octavo, 72 pp. Bulletin No. 119 of the United States Geological Survey; price, 10 cents.

Contains a description of the geologic structure of portions of the Big Horn Range and Big Horn Basin, especially with reference to the coal fields, and remarks upon the water-supply and agricultural possibilities.

Report of progress of the division of hydrography for the calendar years 1893 and 1894, by F. H. Newell, 1895; octavo, 176 pp. Bulletin No. 131 of the United States Geological Survey; price, 15 cents.

Contains results of stream measurements at various points, mainly within the arid region, and records of wells in a number of counties in western Nebraska, western Kansas, and eastern Colorado.

1896.

Seventeenth Annual Report of the United States Geological Survey, 1895–96, Part II, Economic geology and hydrography, 1896; octavo, 864 pp.

Contains papers on "The underground water of the Arkansas Valley in eastern Colorado," by G. K. Gilbert; "The water resources of Illinois," by Frank Leverett, and "Preliminary report on the artesian waters of a portion of the Dakotas," by N. H. Darton.

Artesian-well prospects in the Atlantic Coastal Plain region, by N. H. Darton, 1896; octavo, 230 pp., 19 plates. Bulletin No. 138 of the United States Geological Survey; price, 20 cents.

Gives a description of the geologic conditions of the coastal region from Long Island, New York, to Georgia, and contains data relating to many of the deep wells.

Report of progress of the division of hydrography for the calendar year 1895, by F. H. Newell, hydrographer in charge, 1896; octavo, 356 pp. Bulletin No. 140 of the United States Geological Survey; price, 25 cents.

Contains a description of the instruments and methods employed in measuring streams and the results of hydrographic investigations in various parts of the United States.

1897.

Eighteenth Annual Report of the United States Geological Survey, 1896–97, Part IV, Hydrography, 1897; octavo, 756 pp.

Contains a "Report of progress of stream measurements for the calendar year 1896," by Arthur P. Davis; "The water resources of Indiana and Ohio," by Frank Leverett; "New developments in well boring and irrigation in South Dakota," by N. H. Darton, and "Reservoirs for irrigation," by J. D. Schuyler.

1899.

Nineteenth Annual Report of the United States Geological Survey, 1897–98, Part IV, Hydrography, 1899; octavo, 814 pp.

Contains a "Report of progress of stream measurements for the calendar year 1898," by F. H. Newell and others; "The rock waters of Ohio," by Edward Orton, and "A preliminary report on the geology and water resources of Nebraska west of the one hundred and third meridian," by N. H. Darton.

1900.

Twentieth Annual Report of the United States Geological Survey, 1898–99, Part IV, Hydrography, 1900; octavo, 660 pp.

Contains a "Report of progress of stream measurements for the calendar year 1898," by F. H. Newell, and "Hydrography of Nicaragua," by A. P. Davis.

WATER-SUPPLY AND IRRIGATION PAPERS, 1896–1900.

This series of papers is designed to present in pamphlet form the results of stream measurements and of special investigations. A list of these, with other information, is given on the outside (fourth) page of this cover.

Survey bulletins can be obtained only by prepayment of cost, as noted above. Money should be transmitted by postal money order or express order, made payable to the Director of the United States Geological Survey. Postage stamps, checks, and drafts can not be accepted. Correspondence relating to the publications of the Survey should be addressed to The Director, United States Geological Survey, Washington, D. C.

1. Pumping water for irrigation, by Herbert M. Wilson, 1896.
2. Irrigation near Phœnix, Arizona, by Arthur P. Davis, 1897.
3. Sewage irrigation, by George W. Rafter, 1897.
4. A reconnoissance in southeastern Washington, by Israel C. Russell, 1
5. Irrigation practice on the Great Plains, by E. B. Cowgill, 1897.
6. Underground waters of southwestern Kansas, by Erasmus Haworth,
7. Seepage waters of northern Utah, by Samuel Fortier, 1897.
8. Windmills for irrigation, by E. C. Murphy, 1897.
9. Irrigation near Greeley, Colorado, by David Boyd, 1897.
10. Irrigation in Mesilla Valley, New Mexico, by F. C. Barker, 1898.
11. River heights for 1896, by Arthur P. Davis, 1897.
12. Water resources of southeastern Nebraska, by Nelson Horatio Darton
13. Irrigation systems in Texas, by William Ferguson Hutson, 1898.
14. New tests of pumps and water lifts used in irrigation, by O. P. Hood
15. Operations at river stations, 1897, Part I, 1898.
16. Operations at river stations, 1897, Part II, 1898.
17. Irrigation near Bakersfield, California, by C. E. Grunsky, 1898.
18. Irrigation near Fresno, California, by C. E. Grunsky, 1898.
19. Irrigation near Merced, California, by C. E. Grunsky, 1899.
20. Experiments with windmills, by Thomas O. Perry, 1899.
21. Wells of northern Indiana, by Frank Leverett, 1899.
22. Sewage irrigation, Part II, by George W. Rafter, 1899.
23. Water-right problems of the Bighorn Mountains, by Elwood Mead,
24. Water resources of the State of New York, Part I, by George W. Ra
25. Water resources of the State of New York, Part II, by George W. Ra
26. Wells of southern Indiana (continuation of No. 21), by Frank Leve
27. Operations at river stations, 1898, Part I, 1899.
28. Operations at river stations, 1898, Part II, 1899.
29. Wells and windmills in Nebraska, by Erwin Hinckley Barbour, 189
30. Water resources of the Lower Peninsula of Michigan, by Alfred C. I
31. Lower Michigan mineral waters, by Alfred C. Lane, 1899.
32. Water resources of Puerto Rico, by H. M. Wilson, 1900.
33. Storage of water on Gila River, Arizona, by J. B. Lippincott, 1900.
34. Underground waters of a portion of southeastern S. Dakota, by J. E.
35. Operations at river stations, 1899, Part I, 1900.
36. Operations at river stations, 1899, Part II, 1900.
37. Operations at river stations, 1899, Part III, 1900.
38. Operations at river stations, 1899, Part IV, 1900.
39. Operations at river stations, 1899, Part V, 1900.
40. The Austin dam, by Thomas U. Taylor, 1900.
41. The windmill: its efficiency and economic use, by E. C. Murphy, I
42. The windmill: its efficiency and economic use, by E. C. Murphy, P
43. Conveyance of water in irrigation canals, etc., by Samuel Fortier.
44. Profiles of rivers in the United States, by Henry Gannett, 1901.

In addition to the above, there are in various stages of preparation o papers. Provision has been made for printing these by the following c sundry civil act making appropriations for the year 1896–97:

Provided, That hereafter the reports of the Geological Survey in rel gaging of streams and to the methods of utilizing the water resources ma in octavo form, not to exceed 100 pages in length and 5,000 copies in nu copies of which shall be for the official use of the Geological Survey, shall be delivered to the Senate, and 2,500 copies shall be delivered to t Representatives, for distribution. [Approved June 11, 1896; Stat. L., vo

The endeavor is made to send these pamphlets to persons who ha assistance in their preparation through replies to schedules or who ha data. Requests specifying a certain paper and stating a reason for ask granted whenever practicable, but it is impossible to comply with gene such as to have all of the series sent.

Application for these papers should be made either to Members of C